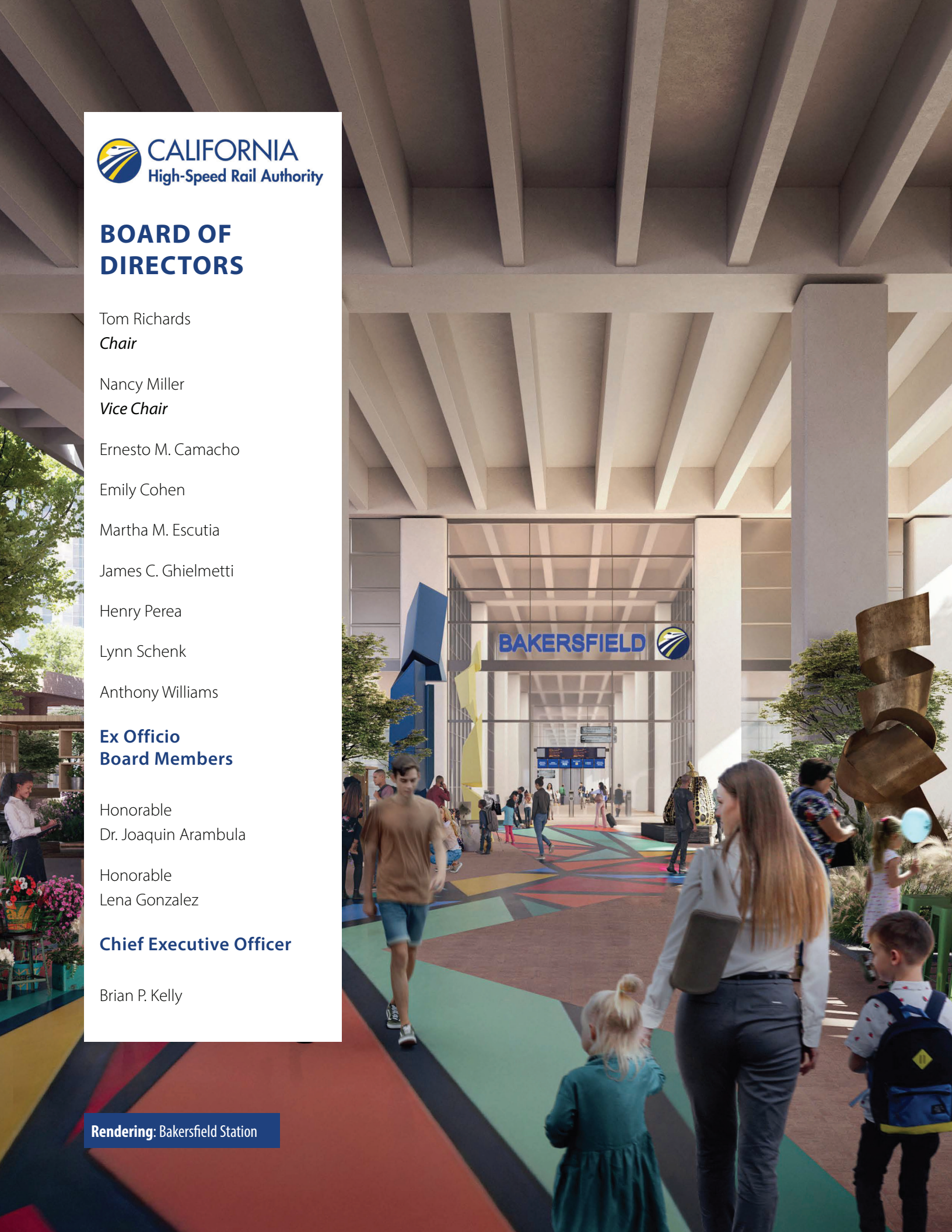
CALIFORNIA
High-Speed Rail Authority

2024 BUSINESS PLAN



CALIFORNIA
High-Speed Rail Authority

BOARD OF DIRECTORS

Tom Richards
Chair

Nancy Miller
Vice Chair

Ernesto M. Camacho

Emily Cohen

Martha M. Escutia

James C. Ghielmetti

Henry Perea

Lynn Schenk

Anthony Williams

Ex Officio Board Members

Honorable
Dr. Joaquin Arambula

Honorable
Lena Gonzalez

Chief Executive Officer

Brian P. Kelly

Rendering: Bakersfield Station

Table of Contents

LETTER FROM THE CEO V

EXECUTIVE SUMMARY XI

CHAPTER 1: ADVANCING THE STATEWIDE HIGH-SPEED RAIL PROJECT 1

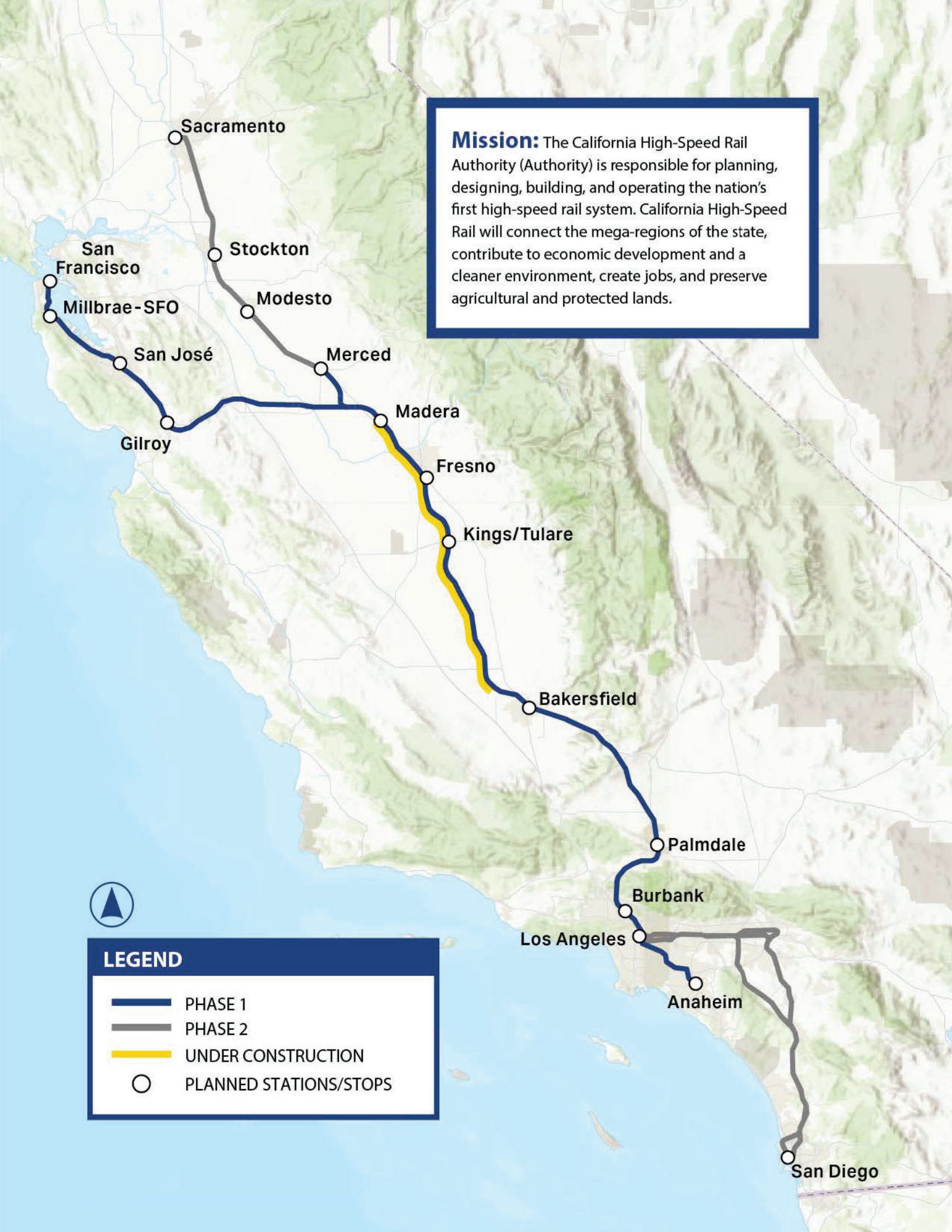
CHAPTER 2: MOVING FORWARD IN THREE DISTINCT REGIONS 15

CHAPTER 3: FUNDING THE PROGRAM 51

CHAPTER 4: ACCOUNTABILITY THROUGH RISK MANAGEMENT 73

CHAPTER 5: FORECASTS AND ESTIMATES 89

APPENDICES 107


Sacramento
Stockton
San Francisco
Modesto
Millbrae-SFO
San José
Merced
Madera
Gilroy
Fresno
Kings/Tulare
Bakersfield
Palmdale
Burbank
Los Angeles
Anaheim
San Diego
Mission: The California High-Speed Rail Authority (Authority) is responsible for planning, designing, building, and operating the nation's first high-speed rail system. California High-Speed Rail will connect the mega-regions of the state, contribute to economic development and a cleaner environment, create jobs, and preserve agricultural and protected lands.
LEGEND
PHASE 1
PHASE 2
UNDER CONSTRUCTION
PLANNED STATIONS/STOPS

LETTER FROM THE CEO

"America was not built on fear. America was built on courage, on imagination and an unbeatable determination to do the job at hand."

— President Harry Truman

When I started this job six years ago, many people asked me, "How will you get more funding dedicated to high-speed rail in California?" My answer then was simple: "Today, we are not even in a position to ask."

Indeed, back in 2018, the project was struggling internally and under relentless attack externally. It suffered from uncertain scope definition, increasing costs, delays, and seemingly intractable disputes between the Authority and its contractors due to scope ambiguity. Demonstrable progress was illusory. Politically, there was no opportunity to seek new funding or broaden support for the project.

Things have changed.

Over the last six years, the Authority — its Board, management, and staff working together — focused more keenly on project definition and setting project milestones that were realistic and achievable. This shift allowed us to better prioritize our work, build the capacity to deliver it, problem solve with our contractors, and most importantly, get work done.

With better scope definition, we were able to advance designs to completion, clarify with the public and our partners what we are building, identify and acquire needed right-of-way, and move utilities so construction could advance. Today, our first civil works construction package in the Central Valley (CP 4) is substantially complete, and the guideway and structures for the 22.5-mile segment are all but done. The only remaining task to resolve is a land-rights dispute between third parties that affects just 400 feet of guideway. The other construction packages — CP 1 and CP 2-3— remain on schedule to be completed in 2026, as we announced in our 2023 Project Update Report (PUR).

Photo: CEO Brian Kelly and FRA Administrator Amit Bose tour the Cedar Viaduct in Fresno

Similarly, by adopting preferred alternatives for our alignment between San Francisco and Los Angeles, the Board enabled our environmental and legal teams to advance the environmental analyses so that we could complete the environmental review process on additional project segments. In 2018, 119 miles of the project were environmentally cleared. Today, 422 miles are cleared, and early this year the Board will consider certifying the environmental documents for the 41-mile section between Palmdale to Burbank, giving final clearance to the 463 miles of the project between downtown San Francisco and downtown Los Angeles.

The lesson is simple: define objectives clearly, establish realistic goals, develop effective risk mitigation plans, measure performance, communicate effectively, and advance the work.

The 2023 PUR, released by the Authority in March 2023, provided a credible vision for how the Authority would advance its work toward a high-speed rail initial operating segment in the Central Valley between 2030 and 2033.

The report reset ridership estimates, as well as schedules and costs for the work to be done, and outlined a funding gap to complete the initial operating segment, as well as the Authority's strategy to fill the $8 billion to $10 billion gap. The report described a detailed five-year, $8 billion strategy to bring more federal funds to the project. With respect to state funding, the PUR informed the Legislature state funds dedicated to the project must be stabilized, particularly in light

of the approaching sunset of the state's Cap-and-Trade Program, which provides the only means of ongoing state funding for high-speed rail in California.

In short, the report was an important reset of where the project was and where it intends to go. It included achievable milestones to complete an operating segment in the Central Valley while we advance our work in the Bay Area and Southern California. In January 2024, after reviewing the assumptions and data that went into the 2023 PUR, the newly appointed Inspector General for high-speed rail reported:

"The Authority generally included all statutorily required elements in the report and appears to have a reasonable basis of the project plans, cost estimates, and other information provided in the report. Thus, we concluded that the Authority met its objective in issuing a credible update of the status of the high-speed rail project."

Having submitted a credible plan in early 2023, the Authority now presents our 2024 Business Plan, a plan that reports to policymakers and the public our progress toward the objectives laid out in the PUR. The 11 months between our 2023 report and this Business Plan have been very productive, with the following significant highlights:

- The Authority was awarded $3.3 billion in new federal funds to advance the work on the initial operating segment between Merced and Bakersfield, making 2023 a year in which the federal government reinvested in the project and renewed an important partnership.
- The Authority advanced necessary procurements to evolve the project from construction into operations, including the procurements to purchase electrified trains, design the track and systems, and bolster engineering services in our rail operations division.
- The first construction package (CP 4) covering 22.5 miles in the Central Valley reached substantial completion.
- The Authority's construction jobs exceeded 12,200 in 2023. The Authority also completed 17 new structures and set records for the number of daily workers on the job sites.
- The Authority exceeded its goals for the percentage of right-of-way parcels acquired (98%) for the 119 mile Central Valley Segment and the number of utilities relocated in a single year (250) along the current construction segment.
- The designs for the extensions to Merced and Bakersfield, as well as the four Central Valley stations, are on schedule, meeting contract milestones for 2023.

Of course, just as there are project achievements to recognize and celebrate, there are also project risks we continue to monitor and mitigate. The largest single risk to the project remains the instability of project funding. The grant awards received to date are valuable and important steps, but the Authority recognizes that we must continue to deliver on our milestones to maintain federal investment and work constructively with the Legislature to stabilize state funding beyond 2030. Funding and other risks we manage are identified in Chapter 4.

With the increased investment from the federal government this year, the project's funding picture is improved compared to the earlier part of 2023. Chapter 3 updates cost and funding estimates and assumptions that were first reported in the 2023 PUR. In sum, the short-term funding picture is improved, but long-term funding stability still must be addressed.

While the Central Valley remains the center of our construction and early operations work, this is very much a statewide project. The Authority is advancing work in three distinct segments of roughly equal distance — the Bay Area (159 miles), Central Valley (171 miles), and Southern California (164 miles). In the early part of 2024, the Authority Board will consider certifying the environmental document for the Palmdale to Burbank segment. With that work completed, the entire Phase 1 system from downtown San Francisco to downtown Los Angeles will be environmentally cleared. As we move construction forward in the Central Valley, the Authority will be looking to advance design work in the Bay Area and Southern California, as well as complete more of the "bookend" projects in those regions.

With the combination of federal reinvestment in this project, new federal investment in the Brightline project between Rancho Cucamonga and Las Vegas, and the full environmental clearance from downtown San Francisco to downtown Los Angeles, the Authority will look to advance four key activities outside the Central Valley work:

- Pursue funding to advance design and geotechnical work on the segments to the Bay Area and into the Los Angeles Basin.
- Work closely with Brightline and the High Desert Corridor Joint Powers Authority to identify, optimize and ensure interoperability among the systems.
- Release a new Request for Expression of Interest for private parties to participate in project funding for segments between San Francisco and Los Angeles.
- Work with the Early Train Operator (ETO) and other experts to holistically evaluate Phase 1 costs and construction methods to ensure efficiency as the project expands.

Chapter 1 provides a descriptive summary of the work the Authority is advancing statewide.

This 2024 Business Plan reflects a transformative transportation mega-project on the move, with a renewed federal partnership. This plan provides policymakers and the public with a look at the promise, challenges, risks, and opportunities that are behind us and before us. The last year saw project advancement like no year prior but make no mistake — just as the country was built, it will take courage, imagination, and an unbeatable determination to complete this job at hand.

Brian P. Kelly
Chief Executive Officer

Photo: Conejo Viaduct in Fresno County

Photo: Hanford Viaduct in Kings County

EXECUTIVE SUMMARY

Introduction

The year 2023 was big for the California High-Speed Rail Authority (Authority). With the re-engagement of our federal partners, most notably in the form of a $3.1 billion grant in December, our transformative project has gained momentum and a solid vote of confidence — the nation is looking to us.

Electrified high-speed rail will provide critical mobility and serve as a foundation for California's sustainable development, setting new public policy precedents and creating new opportunities that will shape industries. We are proud of the local and statewide benefits this project has provided to date, and the near- and long-term economic, social, and environmental benefits as shown in **Exhibit 0.0** demonstrate the clear necessity of high-speed rail in California.

Our federal partners — led by the Biden-Harris Administration and the U.S. Department of Transportation (USDOT) — have chosen to prioritize transportation projects that adhere to the USDOT's priorities of equity, climate, and sustainability, safety, and transformation. President Joseph Biden Jr. has been a longtime supporter of U.S. passenger rail service and has shown an unprecedented commitment to advancing high-speed rail in the United States. The passage of the Infrastructure Investment and Jobs Act (IIJA) in November 2021 provided the Authority and many of our partner agencies access to portions of the $1.2 trillion allocated for transportation and infrastructure spending, with $550 billion going toward "new" investments and programs.

> "Think of how this train will transform California's Central Valley with new businesses, new residents, visitors, economic opportunities, or what it will mean for people who live in inland towns and commute to work in coastal cities. It's a game changer."
>
> — President Joseph Biden Jr.

The Newsom Administration, the California Legislature, and the California State Transportation Agency (CalSTA) also share the federal government's commitment to build transportation projects geared for the future rather than those of the past. CalSTA's core four priorities are safety, equity, climate action, and economic prosperity. California leads the way nationally in reducing greenhouse gas emissions and transitioning to a sustainable, low-carbon future by focusing on achieving carbon neutrality across all sectors. The all-electric high-speed rail system is crucial to shift travel away from automobiles and short-haul air travel and to play a key role in California's ambitious plan to reduce statewide GHG emissions to 85 percent below 1990 levels by 2045 (California Climate Crisis Act [Assembly Bill 1279]).

This project is also being delivered in a manner that emphasizes equity and economic opportunity for all Californians. Minority and low-income communities have historically borne a disproportionate burden of past major transportation projects from the effects of pollution, among other factors. The Authority is committed to upholding the principles of environmental justice (EJ) — the fair treatment of people of all races, cultures, and income levels, including minority and low-income populations, with respect to the development, adoption, implementation, and enforcement of environmental laws and policies.

Finally, the Authority is committed to responsible leadership and management, transparent practices, and sound business planning. A major component of that responsibility is effective risk management.

The 2024 Business Plan summarizes the progress we have made over the past 11 months, updates information and forecasts that were presented in our 2022 Business Plan and 2023 Project Update Report (PUR), and presents our proposed path forward for delivering the project.

The main takeaways from this report are as follows:

- We are continuing to advance the project to meet the cost and schedule estimates in the 2023 PUR. Progress, schedule, and risk components of construction are discussed in Chapter 2.
- We have successfully received more than $6.8 billion from the federal government during the project's lifetime and look to continue aggressively applying for grants to move the project forward.
- With the re-investment from our federal partner, it is increasingly urgent to stabilize state funding for the program beyond 2030.
- In light of constrained funding, we continue to be laser-focused on delivering our project in building blocks by adhering to the following priorities to get the Merced to Bakersfield system operational between 2030 and 2033:

  1. Complete civil and track and systems construction of the 119-mile segment currently under construction in the Central Valley.
  2. Extend civil and track and systems construction work to Merced and Bakersfield for a total of 171 miles.
  3. Continue to complete environmental reviews of remaining project sections between San Francisco and Los Angeles — in 2024, 463 of 494 miles of the project will be environmentally cleared.
  4. Advance geotechnical and design work where environmental work is completed.
  5. Continue important work with our partners on bookend projects, including the Caltrain electrification project and the LinkUS project.

Exhibit 0.0: Progress and Benefits of California High-Speed Rail

$18 Billion
Economic Output

Program Expenditures
(July 2006 to June 2023)

$203 Billion
Total Economic Output

(Through Phase 1)

820
Small Businesses Engaged

(As of November 2023)

12,200
Construction Jobs to Date

92,000
Job Years Created

(July 2006 to June 2023)

$6.5 Billion
Benefits to Disadvantaged Communities

(July 2006 to June 2023)

400,000 Cars
GHG Emissions Removed

For all LA to SF service (annually)

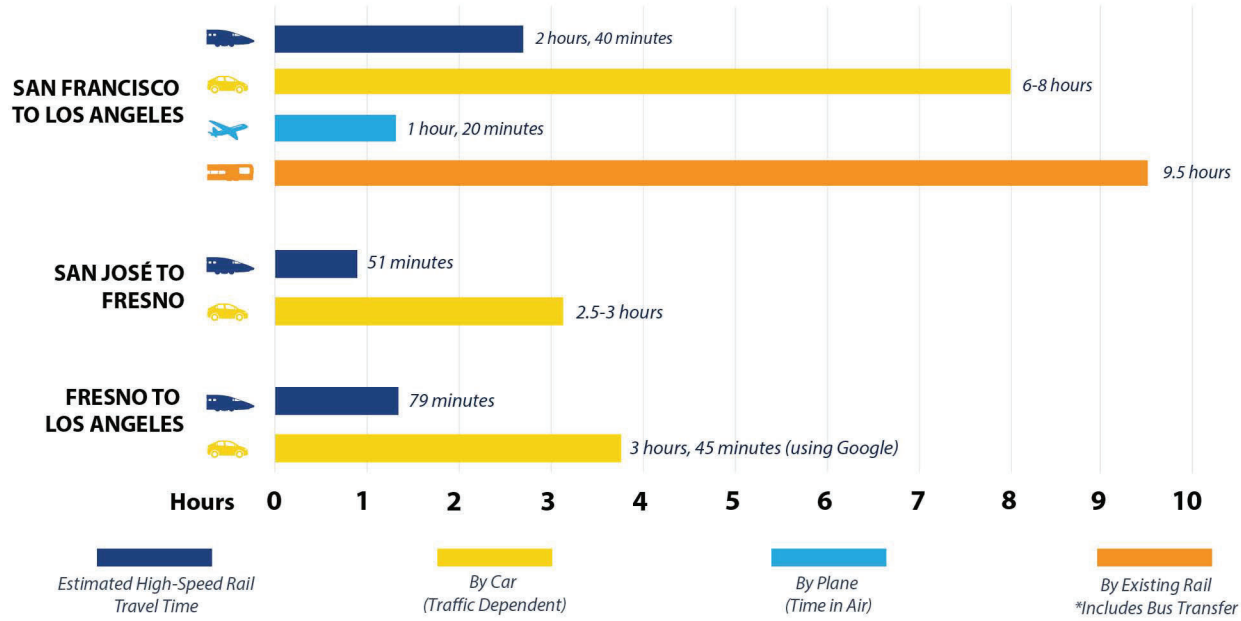
1,358 Tons
Lifetime VERA Construction Emission Offsets

Voluntary Emission Reduction Agreements (VERA)

4,492 Acres
Habitat Land Restored or Preserved

Central Valley through 2022

Travel Time Comparison


SAN FRANCISCO TO LOS ANGELES
2 hours, 40 minutes
6-8 hours
1 hour, 20 minutes
9.5 hours
SAN JOSÉ TO FRESNO
51 minutes
2.5-3 hours
FRESNO TO LOS ANGELES
79 minutes
3 hours, 45 minutes (using Google)
Hours 0 1 2 3 4 5 6 7 8 9 10
Estimated High-Speed Rail Travel Time
By Car (Traffic Dependent)
By Plane (Time in Air)
By Existing Rail *Includes Bus Transfer

Note: The travel times for automobile, air, and conventional rail travel are actual travel times. The time shown for high-speed rail is the designed time. Actual operating time for High-Speed Rail will vary from designed times depending on the number of station stops and other factors. For example, revenue service travel times between San Francisco and Los Angeles will be approximately three hours.

Major Accomplishments and Progress

Since the 2022 Business Plan and the 2023 PUR, the high-speed rail program has made significant progress across several areas, including federal funding and support, environmental clearance, procurement, and construction. Notable accomplishments include:

Federal Funding:

In the largest show of support to date for the project, the Biden-Harris Administration awarded the Authority a record $3.1 billion in December 2023 to advance construction in California's Central Valley toward the project's goal of clean, fast, and affordable transportation from Los Angeles to San Francisco.

Construction Package 4 (CP 4):

The 22.5-mile CP is substantially complete, with just a 400-foot section left to resolve. This segment stretches from the Tulare-Kern County line to Poplar Avenue in Kern County and involves a series of complex construction projects. The package included building seven underpasses, two overpasses, a pedestrian structure, and a major viaduct/pergola.

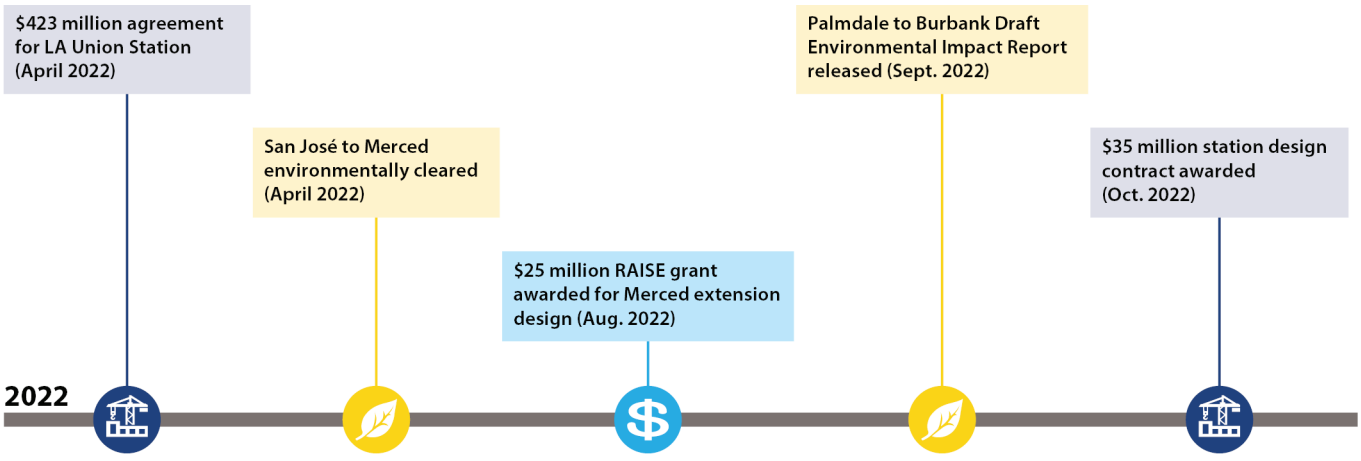
Jobs:

To date, the project has created more than 12,200 construction jobs, with more than 70 percent of these jobs filled by residents from disadvantaged communities. In addition, the project is actively promoting participation of small business enterprises from across the state. The employment opportunities presented by this project extend well beyond construction activities. The project opens avenues for additional technical roles, including positions in engineering, program management, and finance. As we move forward, the project will provide further job creation opportunities from ongoing rail operations and continue to bolster local economies.

Merced to Bakersfield Extensions:

We have reached a pivotal milestone with the Merced to Bakersfield extensions, achieving the critical 30 percent draft design threshold. This work enables us to confidently progress toward final design and the commencement of right-of-way acquisition. The Authority remains focused on an operational line between Merced, Fresno, and Bakersfield between 2030 and 2033.

Exhibit 0.1: 2022 Accomplishments Timeline


$423 million agreement for LA Union Station (April 2022)
San José to Merced environmentally cleared (April 2022)
$25 million RAISE grant awarded for Merced extension design (Aug. 2022)
Palmdale to Burbank Draft Environmental Impact Report released (Sept. 2022)
$35 million station design contract awarded (Oct. 2022)
2022

Quality and Efficiency Improvements:

As we begin completing key construction projects, our emphasis on quality has intensified. In early 2023, at the direction of the CEO, the Authority underwent a detailed analysis of structures and embankments completed or under construction along the alignment to pursue "best in the nation" quality. The Authority shifted its approach to quality oversight of construction with the support of an independent technical peer review panel. This heightened focus has led to improved results, collaborative problem solving, and more effective project delivery.

Train Procurement:

We have made substantial progress in our pre-design and early construction phases, and we are advancing toward a critical next step for operationalizing the rail system: procurement of high-speed trainsets. This procurement includes six electric trainsets designed for speeds up to 220 mph.

Track and Systems:

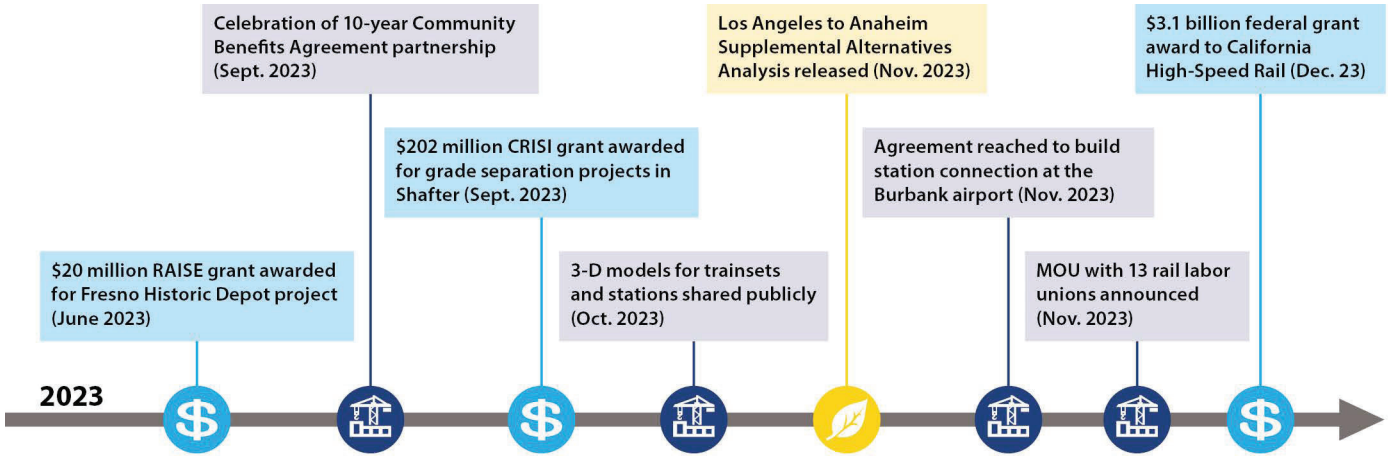
Similarly, we have begun the procurement process for train tracks and operational systems — the physical rails and accompanying control and safety technologies. In November 2023, the Board approved the release of a Request for Qualifications (RFQ) to industry for design services for track and overhead contact systems (OCS) for the initial 171-mile passenger service connecting Merced to Bakersfield.

Station Designs:

Concept designs for the four Central Valley stations were completed in November 2023. We will continue with schematic design and design drawings, enabling us to reach a critical 30 percent design threshold in 2024.

Exhibits 0.1 and **0.2** highlight additional construction, environmental and funding accomplishments by the Authority from 2022 to 2023.

Exhibit 0.2: 2023 Accomplishments Timeline


Celebration of 10-year Community Benefits Agreement partnership (Sept. 2023)
$202 million CRISI grant awarded for grade separation projects in Shafter (Sept. 2023)
$20 million RAISE grant awarded for Fresno Historic Depot project (June 2023)
3-D models for trainsets and stations shared publicly (Oct. 2023)
Los Angeles to Anaheim Supplemental Alternatives Analysis released (Nov. 2023)
Agreement reached to build station connection at the Burbank airport (Nov. 2023)
MOU with 13 rail labor unions announced (Nov. 2023)
$3.1 billion federal grant award to California High-Speed Rail (Dec. 23)
2023

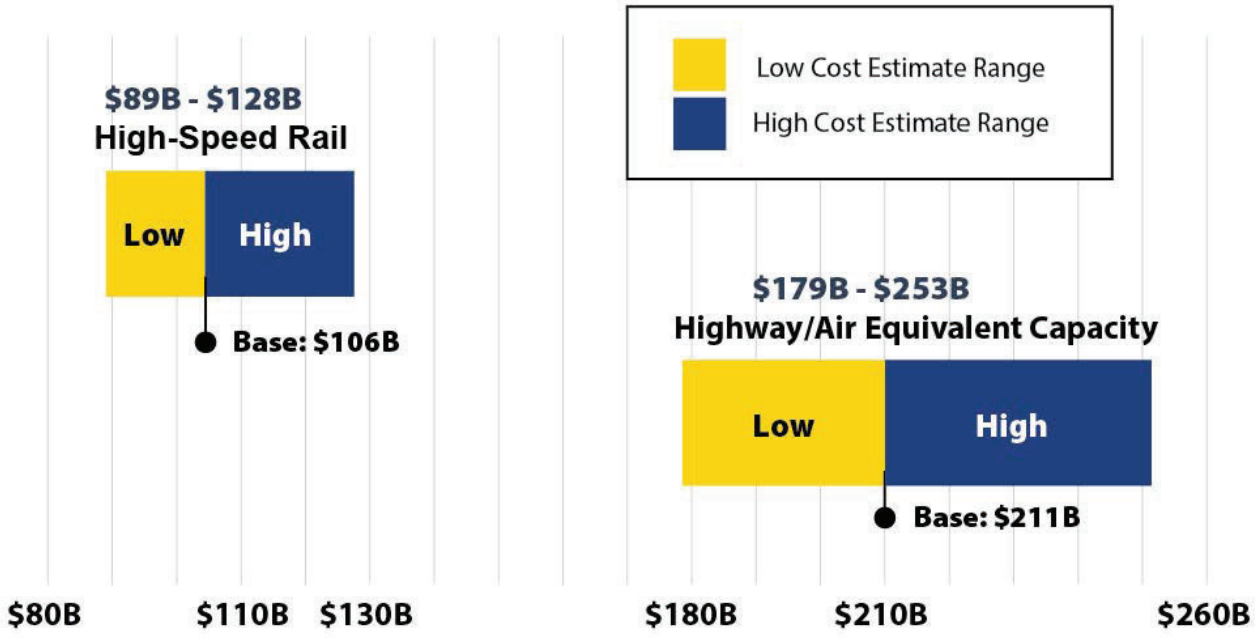
Capital Costs

In the 2023 Project Update Report (PUR), the California High-Speed Rail Authority (Authority) materially revised its capital cost forecasts. This included updates on the developments in the Central Valley, the progress on the Early Operating Segment (EOS) from Merced to Bakersfield, and the advancements in Phase 1, particularly with the completion of the environmental phase for the project segments from San Francisco to Merced. These comprehensive updates have been carried forward from the 2023 PUR to this Business Plan. These revisions reflect the substantial progress and performance of the Authority in precisely defining the scope, schedule, and consequently, the cost forecasts for the implementation of high-speed rail in California. Capital costs are discussed in detail in Chapter 5.

Our estimated costs to build a double-tracked, electrified high-speed service connecting Merced, Fresno, and Bakersfield remain within the $30 billion to $33 billion range as identified in the 2023 PUR.

As shown in **Exhibit 0.3** below, high-speed rail is the best value investment with a cost range of $89 billion to $128 billion compared to the cost range of $179 billion to $253 billion that would be necessary to construct the equivalent highway and air passenger capacity. For more information on the original report, see the ***2019 Equivalent Capacity Analysis Report***.

Exhibit 0.3: Estimated Capital Cost Ranges of High-Speed Rail Phase I System and Equivalent Highway and Airport Capacity (YOE$ in Billions)



Funding

The Authority remains committed to securing remaining funding for the construction and operation of the 171-mile Merced to Bakersfield segment, known as the Early Operating Segment. Funding efforts have included $4.2 billion from Proposition 1A in 2022 and allocations from Cap-and-Trade auctions, which range from $750 million to $1.25 billion annually. Despite these funding sources, there is still a gap between the available funds and the total capital costs.

To bridge this gap, we developed a federal funding strategy and approach to secure $8 billion in new federal grants over the next five years. The Authority was awarded a total of $3.3 billion in federal funds in 2023, and efforts are ongoing to secure additional funding. As new federal grants are received, we adjust our program baseline budget. As discussed in detail in Chapter 3, our budget has been increased to accommodate funds received for building six grade separations in the City of Shafter and the Federal-State grant received in December 2023.

A stable federal funding commitment is key to developing a high-speed rail system in accordance with international standards. We are also pursuing state funding stability as existing funding sources approach expiration.

Ridership

Recent trends in public transportation use create a complex picture for all major public transportation systems in the United States. While there has been a modest uptick in projected ridership in the Valley to Valley (Silicon Valley to Central Valley) segment from the 2023 PUR, the numbers remain lower than reported before the pandemic, primarily due to a decrease in California population projections. Despite these challenges, ridership forecasts indicate that high-speed rail in the Merced to Bakersfield segment will more than double current rail ridership.

Based on our ridership models, with future year forecasts produced for 2030, 2040, and 2050, the full 494-mile system is projected to serve 28.4 million riders by 2040, providing substantial mobility benefits and reducing greenhouse gas emissions compared to pre-pandemic intercity services. Moving forward, efforts will be focused on refining the integrated service plan, modernizing fare policies, and engaging in necessary agreements to further enhance ridership. We see a potential for a noteworthy increase in rail system usage and meeting the needs of modern commuters. More details on ridership can be found in Chapters 1 and 5.

Risk

The Authority has implemented a robust risk management program, establishing core processes, tools, and practices to identify and address risks that could impact our project. We have successfully improved planning, management, and collaboration with stakeholders, resulting in achievements such as improved property acquisition in the Central Valley, resolution of commercial issues, a settlement with the Burbank-Glendale-Pasadena Airport Authority, stay agreements in Bay Area litigation, and completion of the Semitropic Water Storage District canal realignment in Kern County.

While uncertainties and risks have decreased as the high-speed rail program progresses, new risks continue to emerge. The Authority remains committed to transparency, collaboration, and effective risk management to address these threats and capitalize on opportunities. The Authority's Risk Management Office plays a crucial

role in detecting, monitoring, and supporting the management of risks to ensure the project's success. The top risks include:

Funding Uncertainty: If the Authority receives new funding, it can make more timely decisions to advance construction or other program elements, reducing risk to the program schedule and budget.

Third-Party Management: Interface, dependencies, changing conditions, and approvals related to third parties pose substantial risk to the design and construction of the project and the program schedule. Clear and constant communication with third-party partners leads to more timely decision making (as per Risk chapter) and more efficient project delivery.

Workforce Planning: The Authority will be unable to deliver the high-speed rail project if it cannot secure appropriate staffing to meet its demands and requirements. This can be achieved by successfully securing additional positions through the budget change proposal (BCP) process, reclassifying existing positions, and/or efficiently managing staffing priorities to support the future demands and requirements of the project.

Program Integration Management: If the Authority is unable to efficiently and effectively move from the construction phase to the rail operations phase of the project, then significant schedule delays, increased costs, and other adverse impacts could result.

Schedule Monitoring and Management: The Authority is committed to effectively manage, monitor, and report progress toward program schedule milestones to its internal and external stakeholders to inspire public trust and to detect and mitigate potential delays.

The full risk register list can be found in Chapter 4.

Central Valley Construction Schedule

Our construction efforts in the Central Valley remain on schedule. See **Exhibit 0.4** for an overview of Central Valley construction progress percentage updates for 2023 and projected progress for 2024.

Each of the construction packages remain on schedule as reported in our 2023 PUR:

- Construction Package 4 (22.5 miles from the Tulare-Kern County line to Poplar Avenue in Kern County) was substantially completed, with one land-rights dispute affecting just 400 feet remaining to be resolved.
- Construction Package 2-3 (65 miles from Fresno to the Tulare-Kern County line) is set to be completed in 2026.
- Construction Package 1 (32 miles from Avenue 19 in Madera County to East American Avenue in Fresno County) is set to be completed in 2026.

The project's highest priority is to complete the Merced to Bakersfield line (consisting of the above three construction packages and the Merced and Bakersfield extensions), with an aggressive goal to initiate service between 2030 and 2033. See Chapter 2 for more details on construction in the Central Valley, including next steps to complete advance design of the Merced and Bakersfield extensions.

Exhibit 0.4: Central Valley Construction Progress

	2022	2023	2024 (Projected)
Authority Approved Design Completed	100%	100%	100%
Right-of-Way Parcels Delivered to Contractors	96%	98%	99%
Utility Relocation Complete/In Progress	71%	83%	86%
Structures Complete/In Progress	74%	77%	88%
Miles of Guideway Complete/In Progress	74%	77%	83%
Overall Contract	66%	73%	79%

Northern and Southern California Status

While construction is underway in the Central Valley, the Northern and Southern California regions have either completed the environmental process or soon will.

In Northern California, environmental clearance has been completed and the region is preparing for advanced design as funding becomes available. The project includes the integration of high-speed rail with existing rail networks, highlighted by an investment of more than $700 million for the electrification of the Caltrain corridor between San Francisco and San José. The project also features collaborative ventures like the Portal (formerly known as the Downtown Extension Project), aimed at linking the current rail line to downtown San Francisco's Salesforce Transit Center, and the Diridon Integrated Concept Plan for transforming Diridon Station in San José into a key intermodal hub. The Authority is actively seeking additional funding to continue design work and begin critical geotechnical studies in the Pacheco Pass, a key step for linking to the Central Valley.

Work in Southern California is progressing, with a focus on enhancing regional connections and infrastructure. This includes funding important early projects, meeting environmental clearance goals, and working on grade separations to improve traffic flow.

The LA Metro grade separation at Rosecrans and Marquardt avenues is set for completion in early 2025. This project, funded with $78 million from the Authority, addresses the previously high-risk railroad crossing, which caused vehicles, including trucks, to idle for an average of 21 hours weekly, exacerbating greenhouse gas emissions in an area already suffering from poor air quality.

In the Palmdale to Burbank project section, the Draft Environmental Impact Report (EIR) and Environmental Impact Statement (EIS) were released in fall 2022, with the final EIR/EIS expected to be completed soon. This will fully complete environmental clearance from San Francisco to Los Angeles.

Additional plans in Southern California involve connecting the high-speed rail line to Brightline West via the High Desert Corridor, extending to Las Vegas.

> "I'm all aboard for the $3B investment into the California High-Speed Rail Authority! Very grateful of the leadership of Senator Alex Padilla and the Biden Administration for infusing CA with a total of $6 billion for high-speed rail. That much closer to catching up with our peers in Asia and Europe."
>
> — Alex Lee,
> State Assemblymember
> (D-District 24)

The Future of California High-Speed Rail

With the recent funding infusion, the Authority continues to forge ahead. We focus on advancing work in the Central Valley, particularly the Merced and Bakersfield extensions; design and procurement of trainsets; design and construction of the four Central Valley stations; construction of guideways; and implementation of the operating systems that will control the trains. This progress is predicated on the continued financial backing from various sources, including federal, state, and local partnerships, which have been instrumental in reaching the current phase of the project. The vision for a fully operational high-speed rail system hinges on this multi-faceted financial support, driving the project toward its goal of revolutionizing transportation and being a benchmark for transportation in America.

Photo: 2023 Executive Fellow tour of the Cedar Viaduct in Fresno

Sacramento
San Francisco
Millbrae-SFO
San José
Merced
Madera
Gilroy
Fresno
Kings-Tulare
Bakersfield
Palmdale
Burbank
Los Angeles
Anaheim
San Diego
LEGEND
Phase 1
Phase 2
Station

CHAPTER 1:
ADVANCING THE STATEWIDE HIGH-SPEED RAIL PROJECT

Introduction

In 2008, voters passed Proposition 1A, directing the California High-Speed Rail Authority (Authority) to construct an electrified 494-mile-long rail system connecting the mega regions of Los Angeles and San Francisco to the growing cities of the Central Valley. With renewed focus, clear project definition and achievable goals established, 2023 brought a year of historic progress to the project. In December 2023, in the most powerful display of federal support to date, the U.S. Department of Transportation (USDOT) awarded the Authority $3.1 billion in grant funding to continue progress on advancing high-speed rail in California's Central Valley, bringing the total awarded to date under President Biden's Infrastructure Investment and Jobs Act (IIJA) to more than $3.3 billion.

The reinvestment of federal funds into the project reflects a renewed federal partnership and an important endorsement of the Authority's plan to get high-speed rail operating in California. In the 2023 Project Update Report (PUR), the Authority articulated steps necessary to achieve operational service in the Central Valley within a schedule window of 2030 to 2033. Today, with a committed federal partner and strong leadership at the state level, the schedule window remains consistent with what it was a year ago. To meet that goal, we continue deploying several strategies to mitigate risk for cost and schedule pressures. These include:

- Refining design work prior to construction contracts being executed to ensure clear project scope;
- Utilizing strategic procurement packaging options to create greater competition; and
- Applying lessons learned from Central Valley construction. These efforts are described in detail in this report.

Statewide Progress

Since the 2023 PUR, the Authority has made considerable progress in obtaining additional federal funding to advance work on the project. While completing work in the Central Valley remains the primary focus for the Authority, it's also important to continue to make advancements where possible after environmental clearance has been completed to prepare for pre-construction and construction activities in Northern and Southern California.

At this time, we do not have a specified timeline for project segments outside the Central Valley, as the necessary funding has not yet been secured. The high-speed rail project follows a Staged Project Delivery approach as shown in **Exhibit 1.0**. This process allows us to apply lessons learned and make structured decisions at key project milestones as funding is available. The Authority intends to actively pursue federal funds to advance geotechnical work and advanced design in all segments where the federal and state environmental clearance work is complete.

In December 2023, the Authority was accepted into the Federal Railroad Administration's (FRA) Corridor Identification and Development (Corridor ID) Program. This is a comprehensive, nationwide rail planning program that creates a pipeline of projects ready for implementation. Funding that will be made available to the Authority through the Corridor ID program will allow us to further advance work on scope and schedule in Northern and Southern California. In addition to the Corridor ID program, the following federal grants have been awarded to the Authority to date:

- $3.1 billion from a 2023 Federal-State Partnership for Intercity Rail (Fed-State) grant to support passenger service in the Central Valley, including the purchase of six trainsets and a station in Fresno, and other design and construction activities.
- $202 million from a 2023 Consolidated Rail Infrastructure and Safety Improvements (CRISI) grant for construction of six grade separations in the City of Shafter that are needed for high-speed rail and provide safety benefits to drivers and train operators on the existing freight rail corridor.
- $20 million from a 2023 RAISE grant for the Fresno Historic Depot Project that is part of the Fresno high-speed rail station.
- $25 million from a 2022 RAISE grant for the Madera to Merced configuration-level design contract to prepare that section for construction.

Exhibit 1.0: Staged Project Delivery

Stage 1	Stage 2	Stage 3	Stage 4	Stage 5	Stage 6	Stage 7
Project Initiation	**Identify Preferred Alternative & Begin Preliminary Design**	**Environmental Clearance, Prepare for Pre-Construction**	**Early Works and Right-of-Way**	**Procurement for Construction**	**Construction, Testing and Commissioning**	**Project Close Out**
Define initial scope, cost and schedule	15% Preliminary Engineering	30% Preliminary Engineering	Right-of-Way acquisition	Request for Qualifications/ Proposals	Construction initiated	Transfer completed project from contractor to Authority
Initial scope evaluated in programmatic environmental impact statement	Draft Environmental Impact Report/ Statement (EIR/EIS)	Final EIR/EIS	Third party agreements - railroads, local jurisdictions, utilities	Select contractor/ award contract	Change order management	Detailed project documentation complete
Identify risks	Evaluate range of alternatives	Record of Decision - Environmental Clearance	Environmental permits - federal agencies	Issue Notice to Proceed	Construction completed	
	Identify Preferred Alternative	Risk assessment	Risk assessment	Finalize right-of-way, third party agreements, permits and environmental mitigation	Project tested & commissioned	
	Risk assessment	Develop Procurement/ Delivery Plan			Substantial completion milestone	
		Right-of-Way Mapping			Ready for track and systems	
		Identify Utility Relocations				

- $24 million from a 2021 RAISE grant for State Route 46 where high-speed rail will cross the highway.
- $2.55 billion from the American Recovery and Reinvestment Act of 2009 (ARRA) for initial construction in the Central Valley and advancing engineering and environmental reviews along the entire 494-mile Phase 1 system connecting San Francisco/Merced to Los Angeles/Anaheim.
- $929 million in FY10 grant funding to support construction and electrification components in the Central Valley.

> "California is delivering on the first 220-mph, electric high-speed rail project in the nation. This [$3.1B Federal-State funding] show of support from the Biden-Harris Administration is a vote of confidence in today's vision and comes at a critical turning point, providing the project new momentum."
>
> — Gavin Newsom, California Governor

CASE STUDY

Case Study: $3.1 Billion Federal Grant

The $3.1 billion federal grant awarded to the Authority marks a significant milestone in the construction of the country's first electrified high-speed rail system. This grant, which is the largest ever received by the Authority, will provide crucial funding to continue the development of the 220-mph rail system. The federal support not only bolsters the project's momentum but also contributes to its overall success, with more than 12,200 jobs created in the region thus far.

The recent federal grant will advance work in California's Central Valley, providing funding for:

- Six electric trains for testing and use
- Design and construction of trainset facilities
- Design and construction of the Fresno Station
- Final design and right-of-way acquisition for the Merced and Bakersfield extensions
- Civil works, traction power, track, overhead contact system, and systems for the Bakersfield Interim Extension

Overall, this substantial federal grant empowers the Authority to continue advancing the ambitious project, bringing the vision of a state-of-the-art transportation system closer to reality. By investing in cutting-edge technology, sustainable transportation, and economic growth, this grant sets the stage for a transformative transportation network that will benefit Californians and connect communities across the state.

Environmental Clearance

As part of our prior federal grant obligations, the Authority is responsible for completing environmental clearance on the full 494-mile Phase 1 system. **Exhibit 1.1** illustrates our progress and the capital costs for each segment. At the beginning of the Newsom Administration, only the 119 miles currently under construction had reached environmental clearance. Pending Board of Directors approval, it's anticipated that by June of this year, the continuous stretch between downtown San Francisco and downtown Los Angeles — 463 miles of the full 494-mile system — will be environmentally cleared.

Since the issuance of the 2023 PUR, the following milestones have been achieved:

- Distributed the Palmdale to Burbank project section Administrative Final Environmental Impact Report/Environmental Impact Statement (EIR/EIS) for Cooperating Agency Review, with expected completion of the final EIR/EIS in 2024.
- Released a Supplemental Alternatives Analysis (SAA) for the Los Angeles to Anaheim Project Section.
- Completed the Merced Station Relocation Environmental Reexamination.
- Initiated environmental and preliminary engineering development for a Central Valley heavy maintenance facility in 2023.

"An electrified high-speed rail network will dramatically improve the quality of life in the Central Valley and up and down California. These bullet trains will make travel quicker and easier, bring housing closer, create new jobs and economic opportunities that would otherwise be out of reach, secure cleaner air for our children, and help save our planet."

— Nancy Pelosi, Speaker Emerita

Exhibit 1.1: Environmental Clearance Map and Costs

NORTHERN CALIFORNIA[2]

San Francisco to San José
43 miles
Capital Cost: $5.0 billion
EIR/EIS: Complete

San José to Carlucci Road
88 miles
Capital Cost: $19.6 billion
EIR/EIS: Complete

CENTRAL VALLEY

Merced to Madera
33 miles
Capital Cost: $6.0 billion*
EIR/EIS: Complete

*Includes partial funding for Central Valley Wye

Madera to Poplar Avenue
119 miles
Capital Cost: $19.5 billion
EIR/EIS: Complete
Funded/Under Construction

Poplar Avenue to Bakersfield
19 miles
Construction Cost: $4.3 billion
EIR/EIS: Complete

Central Valley Wye Balance
28 miles
Capital Cost: $2.2 billion
EIR/EIS: Complete

SOUTHERN CALIFORNIA[2]

Bakersfield to Palmdale
79 miles
Capital Cost: $17.1 billion
EIR/EIS: Complete

Burbank to Los Angeles
13 miles
Capital Cost: $2.9 billion
EIR/EIS: Complete

Palmdale to Burbank
41 miles
Capital Cost: $16.8 billion
EIR/EIS: 2024

Los Angeles to Anaheim
31 miles
Capital Cost: $2.9 billion
EIR/EIS: 2025

Notes:

1. Final segment miles dependent on completion of environmental documents. Estimates do not include HMF or trainsets except for Merced to Bakersfield line.
2. Additional statewide funding:
   a. Caltrain Electrification- $714 million
   b. San Mateo Grade Separation- $84 million
   c. Rosecrans/Marquardt Grade Separation- $77 million
   d. Los Angeles Union Station- $423 million

Creating Jobs in California

With construction underway and the Authority moving closer to operations, the economic benefits of the project continue to grow substantially each year. High-speed rail continues to support thousands of jobs across all functions and has spurred economic benefits statewide. Through June 2023, the project has invested approximately $11.2 billion in planning and construction for the rail system. That investment has resulted in $18 billion of economic benefit for California and created $7 billion of labor income. Moreover, the Authority ensures the funding received from the state's Cap-and-Trade program is invested in disadvantaged communities. In FY 2022-2023, 66 percent of total project expenditure occurred in disadvantaged communities.

LABOR JOB CREATION

The year 2023 marked the 10th anniversary of the Authority's Community Benefits Agreement with the State Building and Construction Trades. Since the start of construction, our project has generated 13,029 construction jobs, see **Exhibit 1.2**, across all construction sites, with more than 70 percent going to individuals in disadvantaged communities. The number of labor jobs created reflects a 500 percent increase since 2019. The average daily number of construction workers on the job sites reached a record high in 2023 (more than 1,600 workers). This consistent and substantial growth underscores the positive economic impact the project is having on an economically disadvantaged region of California.

Additionally, the project creates opportunities for increased technical roles, such as positions in engineering, program and construction management, scheduling, and project costing. Moving forward, the project will provide new job opportunities from operations and continue to bolster local economies associated with the vast high-speed rail network.

Our commitment to diversity, equity, and inclusion as part of President Biden's Justice40 Initiative ensures job opportunities are accessible to disadvantaged individuals and communities, addressing historical inequalities. To date, $6.5 billion of program expenditure has been invested toward the benefit and elevation of disadvantaged communities.

In November 2023, the Authority entered a memorandum of understanding (MOU) with 13 rail labor unions to ensure the hard-earned gains in federal labor laws will be applicable to operations of the nation's first high-speed rail project. The agreement will cover an estimated 3,000 workers who will operate and maintain high-speed trains, facilities, and stations from the Bay Area through the Central Valley and into Southern California.

Exhibit 1.2: Jobs Created Through February 2024

13,029 Construction Jobs Created

CASE STUDY

Case Study: Central Valley Training Center

The Authority has partnered with the City of Selma, Fresno Economic Development Corporation, and Fresno Economic Opportunities Commission to create the Central Valley Training Center, a workforce development center that provides hands-on construction industry training to Central Valley residents. Over the course of 12 weeks, students are exposed to more than 10 different trades, from carpenter to electrician, and they work to gain more than a dozen construction-related certifications. The center is aimed at serving veterans, at-risk young adults, and minority and low-income populations throughout the Central Valley. Since the start of the training center in 2020, 176 students have graduated, including the most recent class of 25 students who completed the program in December.

SMALL BUSINESS OPPORTUNITIES

The Authority is committed to ensuring small businesses, micro businesses, disadvantaged businesses, and disadvantaged veteran business enterprises receive work on the project. To meet and exceed our business goals, the Authority, in partnership with the Business Advisory Council, works to assist and educate underutilized businesses and to ensure access to project opportunities. See **Exhibit 1.3** for the latest small business participation figures.

On November 2, 2023, the Board of Directors, by unanimous vote, resolved to adopt ***Resolution #HSRA 23-07*** to provide greater accountability in the achievement of the Authority's small business program goals and to realign our small business goals with state and federal guidelines. This alignment considered feedback and input the Authority received from both the small business community and the Authority's Business Advisory Council.

Previously, the Authority's small business program goal was expressed as a single combined percentage. As of November 2023, the revised goals have stand-alone requirements consistent with state and federal regulations governing the business certifications accepted by the Authority.

The Authority's business program participation goals are:

- Small Business (SB) participation (state guideline): 25 percent, including 3 percent for microbusinesses
- Disabled Veteran Business Enterprise (DVBE) (state guideline): 3 percent
- Disadvantaged Business Enterprise (DBE) (federal guideline): 10 percent (On contracts that are 100 percent federally funded, a 17 percent DBE participation goal is applied to account for the absence of state SB and DVBE participation.)

To meet all three participation goals, the Authority's program team partners with other state, local, and federal agencies to provide targeted informational workshops to small businesses with subject matter experts; conducts outreach to firms statewide; and hosts educational workshops with a focus on contract opportunities and upcoming procurements.

The Authority also actively engages in preparing and managing procurements by facilitating one-on-one meetings between prime contractors and their subcontractors.

> "The High-Speed Rail Authority's Small Business Program provides countless opportunities and innovation for small businesses like ours. … We are proud to be part of this journey towards a groundbreaking electrified rail system that will revolutionize travel and boost economic growth nationwide."
>
> — Omar E. Hernandez,
> President and CEO,
> Global Urban Strategies, Inc.

Exhibit 1.3: Small Business Participation Through November 2023

01/04/2024

Quality and Safety

At the direction of the CEO, the Authority conducted an independent review of the quality assurance and quality control processes for program delivery. The review included analysis of our structures against the federal National Bridge Inspection Standard (NBIS). The Authority's structures have scored between "good" and "very good" on the NBIS index. The review included further analysis of our quality control and quality assurance practices and made recommendations so the Authority can achieve "best in the nation" quality.

As a result, the Authority implemented a new construction quality model for increased inspection and supervision for structures completed or under construction on the project. While substantial progress has already been made, quality improvement is an ongoing, continuous exercise involving constantly assessing and refining processes.

Our new model for oversight represents a paradigm shift for quality and safety. Under a new Chief Operating Officer, we have brought in new resources to identify quality control issues earlier, and new daily inspection reports are linked to technical criteria requirements, ensuring proper approval and documentation of as-built work. This approach is proactive, aimed at preventing issues from compounding, and avoiding the need to repair or replace nonconforming work.

The project has maintained an excellent safety record, with an Accident Severity Rate of 1.3, lower than the California civil construction average rate of 2.8. We also continue to have a low number of Occupational Injury and Illness and Construction Near Miss incidents, even with an increase in the volume of construction activities and hours performed.

Transportation Industry Recognizes California High-Speed Rail

The Authority won several prestigious awards this year in recognition of its diversity and inclusion practices. Among the awards were the Rosa Parks Diversity Award, the Women in Transportation International Employer of the Year, Women's Transportation Seminar (WTS) San Francisco/Bay Area Chapter Employer of the Year, and the American Planning Association (APA) California Northern Section's 2023 Excellence Award for Advancing Diversity and Social Change.

Ridership Projections

In early 2020, the COVID-19 pandemic brought major changes in corporate and government work-from-home policies. With those changes, public transportation ridership dropped, and transit services were drastically reduced.

This structural shift in ridership hit commuter rail systems particularly hard given their reliance on peak-hour, peak-direction, home-based work trips as their market base. While recovering, ridership levels overall remain well below pre-pandemic levels.

Nationally, while bus ridership has seen a more robust recovery, rail continues to lag. New York Metro regional rail services have recovered as much as 70 percent of their pre-COVID ridership; however, the rest of the nation has seen far lower recovery rates. Through 2023, typical recovery rates at commuter rail operators nationally have hovered at or near 50 percent of pre-COVID levels. Likewise, within California, commuter rail operators such as Metrolink, Caltrain, NCTD, and ACE are all at about 50 percent of pre-COVID ridership rates.

While ridership has begun to recover, it will take many years to fully recapture pre-COVID ridership volumes. To support recovery, agencies will need to re-examine their business models, core markets, and basic approaches to service design and delivery. Part of that process will include integrating networks and leveraging connectivity between services. As such, the Authority's Central Valley Service (CVS), which will integrate service between high-speed rail and connecting regional systems initially in the Central Valley and eventually throughout the state, is critical to the recovery of public transit ridership.

Exhibits 1.4 and **1.4.1** show ridership estimates for various phases of the high-speed rail project and illustrate how the project, by creating connectivity with regional and local transit systems, will increase ridership on those systems as compared to not building high-speed rail. The California Rail Ridership Model (CRRM) is described in detail in Chapter 5.

While ridership nationwide continues to fluctuate for rail and transit operators, analysis conducted by the Authority's Early Train Operator in 2024 and explained in greater detail in Chapter 5 continues to conclude that building electrified high-speed rail in California remains economically beneficial.

When the project is extended into Northern California and the Silicon Valley from the Central Valley, ridership is anticipated to jump to more than 12 million riders annually, roughly the equivalent of the current Northeast Corridor intercity service on the East Coast.

When operational between Los Angeles and San Francisco, California's high-speed rail service is projected to carry roughly 29 million riders, almost 2.5 times the current ridership of the Northeast Corridor intercity service. Complete ridership analysis and forecasts are in Chapter 5.

Exhibit 1.4: Valley to Valley (San Francisco to Bakersfield) Ridership Projections

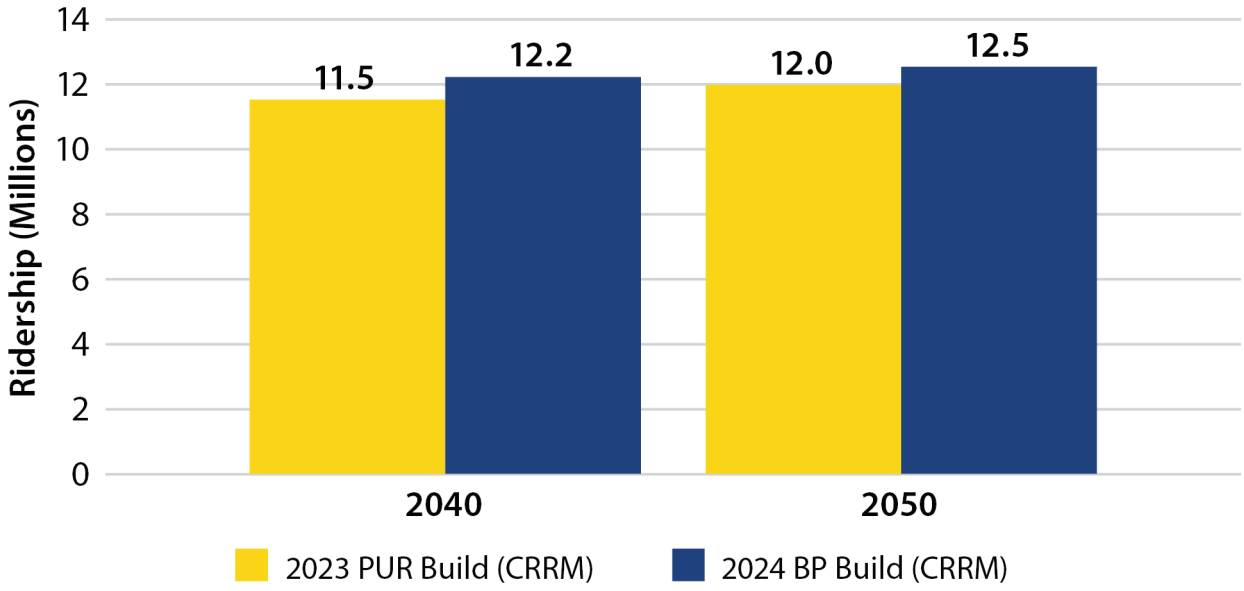
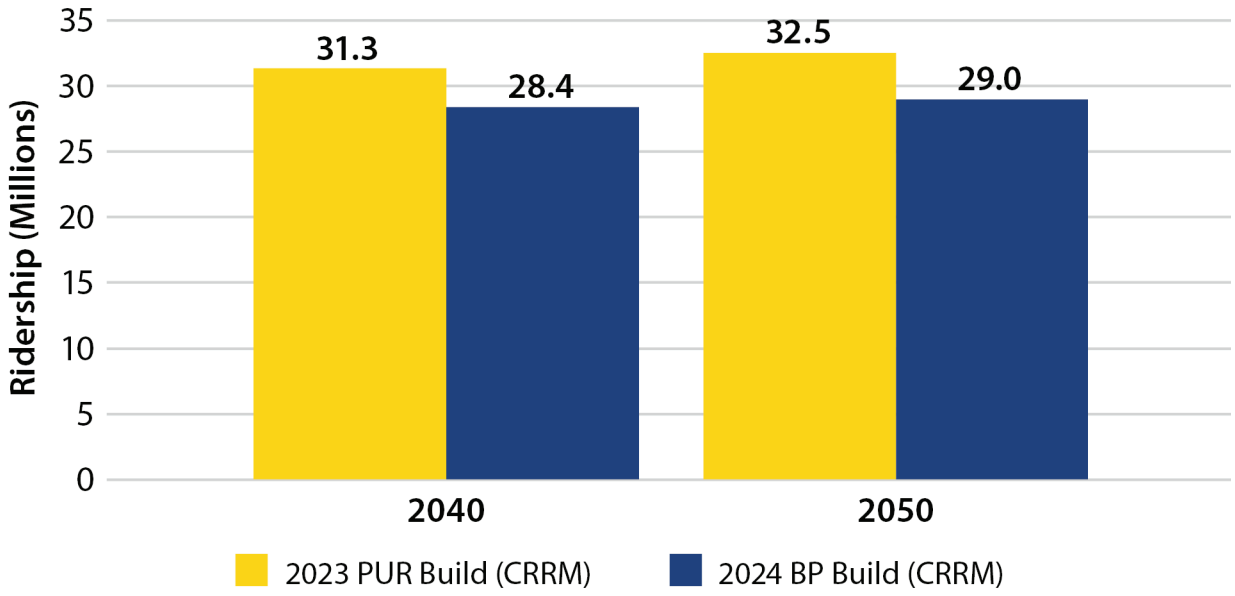


Exhibit 1.4.1: Los Angeles/Anaheim - San Francisco Phase 1 Ridership Projections



NOTE: The ridership model is calibrated using a base year of 2018 (the last full year for which data is available from a range of sources) with future year forecasts produced for three future years: 2030, 2040, and 2050.

Photo: 2023 Poso Avenue underpass in Wasco

Photo: 25th Avenue grade separation in San Mateo

CHAPTER 2:
MOVING FORWARD IN THREE DISTINCT REGIONS

Introduction

In this chapter, we delve into the specific actions taken by the Authority to drive forward the work in each region, respective of their different phases and geographic areas of the state, to advance overall statewide efforts in a constrained funding environment.

Progressing these three distinct regions of roughly the same size — Central Valley (171 miles), Northern California (159 miles), and Southern California (164 miles) — is of utmost importance as we continue to advance the statewide project. While construction and early operations primarily focus on the Central Valley, the success of the larger 494-mile statewide project relies on the progress made throughout the entire state. These efforts collectively contribute to the achievement of the project's objectives, as approved by California voters.

> "California is leading the way on high-speed rail for the nation. We have 119 miles of construction in the Central Valley, dispatching [more than a thousand] workers daily. With top speeds of 220 mph to connect San Francisco to Los Angeles in under 3 hours, we're working to transform transportation in California."
>
> — Pete Buttigieg,
> US Transportation Secretary

Central Valley
Early Operating Segment

STATUS

171 miles

100%
Environmentally cleared

119 miles under construction

52 miles starting advanced design (pre-construction work)

30% station design for Merced, Fresno, Kings/Tulare and Bakersfield

GOALS:

- **Initial operations by 2030-2033**
- **Advance track and system procurement in 2024**
- **Award train contract in 2024**

Progress in the Central Valley

The completion of the 171-mile high-speed rail corridor in the Central Valley offers significant benefits in terms of the economy, mobility, climate, and air quality of the region. In particular, the Merced to Bakersfield corridor serves as a steppingstone toward the broader 494-mile system connecting San Francisco to Los Angeles/Anaheim.

By reducing vehicle miles traveled and the accompanying emissions produced, the use of electrified, zero-emission trains powered by renewable energy will reduce greenhouse gas emissions by around 92,000 metric tons in the first year of operation, reducing global emissions and contributing to improved local air quality.

The 171-mile Merced to Bakersfield segment is comprised of three active construction packages (CP), two segments of advanced design, and five station sites under design/development. This segment of the project is under active construction, dispatching an average of 1,600 men and women every day from the building trades to more than two dozen construction sites.

Since the 2023 PUR, we have made numerous advancements in the Central Valley, including:

- Resolution of all major commercial issues, resulting in a complete project definition and scope.
- Completion of 17 structures among the three active construction segments.
- Improved right-of-way planning and management, resulting in exceeding delivery forecasts with 98 percent of parcels delivered to the design-builder.
- Increased executive engagement and third-party task force efforts, resulting in 97 percent of tracked third-party issues getting resolved in 2023.
- Finalized revised baseline schedules for CP 1 and CP 4, and continuing progress toward establishing a revised baseline schedule for CP 2-3.
- Funding to support advanced design of the Merced and Bakersfield extensions and trainset procurement.
- Prepared environmental agency approvals for advancing Central Valley construction.

Exhibit 2.0 provides 2023 percentages for each construction package, covering design, right-of-way, utility relocation, structures completed, miles of guideway, and overall contract. More details on the construction packages can be found later in this chapter.

Exhibit 2.0: Central Valley Construction Package Progress (119 miles under construction)

	CP 1	CP 2-3	CP 4
Authority Approved Design Completed	100%	100%	100%
Right-of-Way Parcels Delivered to Contractor	98%	99%	100%
Utility Relocation Complete/ In Progess	82%	80%	100%
Structures Complete/ In Progress	85%	76%	100%
Miles of Guideway Complete/ In Progress	63%	75%	100%
Overall Contract	70%	72%	98%

Right-of-Way (ROW) Acquisitions

In 2023 the Authority exceeded its goal for the percentage of right-of-way (ROW) parcels acquired (98%) and the number of utility relocations completed in a single year (254). In 2022, the Authority implemented a new management approach for ROW acquisitions, and as a result, land acquisition is no longer the major risk it once was for the program. The new process has been highly effective, leading to significant improvements in acquisition and schedule forecasting. With these enhancements today, 98% (2,258 out of 2,295) of the parcels needed for the project, as shown in **Exhibit 2.1**, have been successfully delivered to the design-builder. Thirty-seven parcels remain, down from 92 in January 2023.

As an important lesson learned, the Authority will start major construction in the Merced and Bakersfield extensions only when right-of-way has been acquired. Right-of-way acquisition will begin after design reaches draft configuration footprint. For early work packages — such as utility relocations — the Authority is planning to acquire right-of-way after significant utility relocation design has been achieved.

For the Merced and Bakersfield extension projects, the Authority had an initial target range schedule assumption of completing ROW acquisition in approximately three years. Those initial forecasts were determined with minimal design certainty and no funding certainty.

In late 2023, the Authority was awarded new federal grants that fund ROW acquisition. In January 2024, the Authority accepted draft configuration design documents for the extensions, which allows full-parcel acquisitions to go forward. Finally, in April 2024, the Authority received state and federal budget approvals to commence the ROW work funded with the federal grant awards. While these foundational milestones were necessary before the Authority could purchase land in the extensions, the Authority has been advancing early work such as ROW mapping, getting appraisal contracts in order, and setting strategic plans to deliver the work. The Authority will now begin purchasing parcels for these extensions.

Exhibit 2.1: Right-of-Way Parcel Status (Data Through December 2023)

To minimize risk, the Authority has created a tiered parcel strategy, focusing on whole parcel acquisitions and partial acquisitions as design advances. The Authority is strategically approaching acquisitions by identifying and grouping specific groups of ROW parcels in the Merced and Bakersfield extensions so work can start expeditiously while the design process completes. By strategically approaching ROW acquisition, the Authority can take advantage of potential schedule opportunities to advance utility relocations and/or civil works. With limited design, the Authority has identified approximately 500 parcels to acquire for the Merced and Bakersfield extensions combined. As design progresses, there will be better definition on civil works and utility relocations, which traditionally increases the number of parcels needed. The Authority continues to work on value engineering and value analysis opportunities through the design process that could potentially mitigate the overall need for ROW.

The Authority is undertaking a comprehensive analysis of the Merced to Bakersfield project schedule incorporating the funding received and design developments. The target baseline completion assumption remains a three-year duration for the majority of the ROW. Assuming we begin ROW acquisition on the extensions in Fiscal Year 2024-25, the completion of the majority of ROW would be Fiscal Year 2026-27. A limited number of complex acquisitions can take longer than three years, but the Authority's mitigation to these limited situations are to adjust and sequence the construction work as we learn more. Updates to this schedule will be reflected in the 2025 Project Update Report when additional analysis and risk assessments are completed.

Photo: Wasco Viaduct in Kern County

Exhibit 2.2: CP 4 Structures Completed and Under Construction

STRUCTURE NAME	ROW STATUS	UTILITY RELOCATION STATUS	STRUCTURE STATUS
Garces Highway Underpass	✓	✓	✓
Poso Creek Bridge	✓	✓	✓
Pond Road Underpass	✓	✓	✓
Peterson Road Underpass	✓	✓	✓
Kimberlina Underpass	✓	✓	✓
Merced Avenue Overpass	✓	✓	✓
Wasco Viaduct	✓	✓	✓
SR-46 Underpass	✓	✓	✓
Pedestrian Underpass	✓	✓	✓
Poso Avenue Underpass	✓	✓	✓
McCombs Road Overpass	✓	✓	✓

✓ **COMPLETED/SUBSTANTIALLY COMPLETED**

Construction Package 4

The 22.5-mile segment known as Construction Package 4 (CP 4) is the third significant construction contract executed as part of the Early Operating Segment and is now substantially complete, with only a 400-foot segment left to resolve. This represents the first of the major construction contracts to near completion as part of the EOS.

CP 4, which extends from a mile north of the Tulare/Kern County line (the end of CP 2-3) to Poplar Avenue in the south, includes 11 structures. Now that this segment is substantially complete, the Authority can begin the next steps of designing and constructing the track and systems element of the project.

The remaining five CP 4 structures were completed in 2023, including two Kern County overcrossings at McCombs Avenue and Merced Avenue and a grade separation at a major arterial at Poso Avenue in the City of Wasco. These three projects replaced at-grade railroad crossings, improving safety and east-west mobility at each location. A high-speed rail structure was also completed over State Route 46, and a new pedestrian undercrossing was built to provide access to the existing Amtrak station in the City of Wasco. In partnership with BNSF, the Authority also completed a 1-mile realignment of BNSF tracks through the City of Wasco onto the new structure over Poso Avenue.

The delivery of all remaining right-of-way parcels in late spring 2023 facilitated the execution of agreements with the Semitropic Water Storage District, and partnerships with the City of Wasco and Kern County allowed for the completion of the high-speed rail guideway in this segment. This process included the closure of seven existing roadway crossings and the construction of three miles of intrusion protection barriers.

Although the project was impacted by significant rainfall and flooding in early 2023, all utility relocations necessary for the completion of the guideway were completed, including 16 PG&E, 4 AT&T, 18 Semitropic, and several other minor utility relocations. The most significant relocation was the completion of the Semitropic Water Storage Districts Canal 1030, an above-ground, concrete-lined canal that was successfully reconstructed on a new alignment to permit crossing of the high-speed rail corridor. This work in partnership with Semitropic was completed in November 2023; the canal is currently active and in use by the irrigation district.

A single 400-foot section of guideway at the North Kern Water District Canal crossing remains to be completed due to land rights negotiations with the North Kern Water Storage District. These negotiations are expected to be resolved in 2024.

Exhibit 2.2 provides a detailed status of each structure within CP 4 and highlights progress to date.

Exhibit 2.3: CP 1 Structures Completed and Under Construction

STRUCTURE NAME	ROW STATUS	UTILITY RELOCATION STATUS	STRUCTURE STATUS
Road 27 Overhead	✓	✓	✓
Fresno River Viaduct	✓	✓	✓
Avenue 15 1/2 Overhead	✓	✓	✓
Avenue 15 Overhead	✓	✓	✓
Cottonwood Creek Bridge	✓	✓	✓
Avenue 12 HST Overhead	✓	✓	✓
Avenue 12 BNSF Overhead	✓	✓	✓
Avenue 11 Overhead	✓	✓	✓
Avenue 10 Overhead	✓	✓	✓
Avenue 8 Overhead	✓	✓	✓
Avenue 7 Overhead	✓	✓	✓
San Joaquin River Viaduct	✓	✓	✓
Golden State Boulevard Viaduct	✓	✓	✓
Downtown Fresno Viaduct	✓	✓	✓
Muscat Avenue Underpass	✓	✓	✓
American Avenue Overhead	✓	✓	✓
Tuolumne Street Overhead	✓	✓	✓

STRUCTURE NAME	ROW STATUS	UTILITY RELOCATION STATUS	STRUCTURE STATUS
Avenue 9 Overhead	✓	✓	✓
Tulare Street Underpass	✓	✓	🚧
Belmont Avenue Overhead	✓	🚧	🚧
Ventura Street Underpass	✓	✓	🚧
Road 26 Overhead	✓	🚧	⏱
Shaw Avenue Overhead	✓	🚧	⏱
McKinley Avenue Overhead	✓	🚧	⏱
Olive Avenue Overhead	✓	🚧	⏱
Avenue 17 Overhead	✓	✓	🚧
Church Avenue Overhead	✓	🚧	⏱
Jensen Trench	✓	🚧	⏱
Fresno Street Underpass	✓	⏱	⏱
Fresno Trench	🚧	🚧	🚧
Central Avenue Overhead	✓	✓	🚧
Herndon HST Underpass	✓	🚧	⏱
Herndon UPRR Underpass	🚧	🚧	⏱

✓ COMPLETED/SUBSTANTIALLY COMPLETED 🚧 UNDERWAY ⏱ PENDING

Construction Package 1

Significant progress has been made on Construction Package 1 (CP 1) since the publication of the 2023 PUR. CP 1 extends 32 miles from Avenue 19 in Madera County to East American Avenue in Fresno County. This package includes 33 structures, including 26 grade separations, 4 viaducts (including a major crossing over the San Joaquin River), 2 trenches, and a bridge. All major commercial issues have been resolved with the design-build contractor, Tutor Perini/Zachry/Parsons (TPZP). A revised baseline schedule has been agreed upon, with a substantial completion date of November 2026, consistent with what was published in the 2023 PUR.

Several grade separation structures have been completed or have begun construction. Avenue 9 in Madera County was opened to the public in December 2023. The Cedar Viaduct over State Route 99 and North and Cedar avenues was also completed, and construction began on the new roadway crossing over the BNSF railroad on Avenue 17 in Madera and the Central Ave crossing in Fresno.

A key schedule risk noted in the 2023 PUR was mitigated when the City of Fresno issued the permit to close Church Avenue, thereby beginning work on several critical utility relocations. Schedule risks associated with the relocation of utilities in the downtown area of Fresno continue to diminish as we set and meet the goals for utility relocations each year. A total of 151 utility relocations were completed in 2023, a record high for this construction package. At the end of 2023, 18 structures had been completed and 13 were underway. Additionally, 82 percent (818 out of 992) of utilities had been or are in progress to be relocated, and 63 percent of the guideway (32 miles) had been completed or are in progress.

Exhibit 2.3 provides a detailed status of each structure within CP 1 and highlights progress to date.

Exhibit 2.4: CP 2-3 Structures Completed and Under Construction

STRUCTURE NAME	ROW STATUS	UTILITY RELOCATION STATUS	STRUCTURE STATUS
Adams Avenue Overhead	✓	✓	✓
South Avenue Overhead	✓	✓	✓
Kent Avenue Overhead	✓	✓	✓
Fowler Avenue Overhead	✓	✓	✓
Jackson Avenue Overhead	✓	✓	✓
Kansas Avenue Overhead	✓	✓	✓
Peach Avenue Underpass	✓	✓	✓
Davis Avenue Overhead	✓	✓	✓
Tied Arch (SR-43) Underpass	✓	✓	🚧
Conejo Viaduct	✓	✓	🚧
9th Avenue Underpass	✓	✓	✓
Cairo Avenue Underpass	✓	✓	✓
Tule River Viaduct	✓	✓	🚧
Deer Creek Viaduct	✓	✓	🚧
Avenue 56 Overhead	✓	✓	🚧
Avenue 24 Underpass	✓	✓	🚧
Elkhorn Avenue Overhead	✓	✓	✓
Dover Avenue Overhead	✓	🚧	✓
Idaho Avenue Overhead	✓	✓	✓
Mountain View Avenue Overhead	✓	✓	🚧
Avenue 88 Overhead	🚧	✓	✓
Kings River Structure Bridge	✓	🚧	🚧
Excelsior Avenue Overhead	✓	🚧	✓
Flint Avenue Overhead	✓	✓	✓

STRUCTURE NAME	ROW STATUS	UTILITY RELOCATION STATUS	STRUCTURE STATUS
Fargo Avenue Overhead	✓	🚧	🚧
Hanford Viaduct	✓	🚧	🚧
Grangeville Boulevard Underpass	✓	🚧	⏱
Hanford Armona Overhead	✓	🚧	⏱
SR 43 Overhead at Jersey	✓	🚧	⏱
Manning Avenue Overhead	✓	✓	⏱
Lansing Avenue Underpass	🚧	✓	⏱
Floral Avenue Overhead	✓	✓	🚧
Alpaugh Angiola Atwell Trail (AAAT) Underpass	✓	✓	🚧
Cole Slough Bridge	✓	✓	🚧
Access Road Underpass	✓	✓	⏱
Dutch John Cut Bridge	✓	✓	🚧
Whitley Avenue Underpass	✓	✓	🚧
Avenue 156 Underpass	✓	✓	🚧
Stoil Spur Underpass	✓	✓	⏱
Cross Creek Viaduct	🚧	✓	🚧
Houston Overhead	✓	🚧	⏱
Avenue 136 Underpass	✓	🚧	⏱
Avenue 120 Overhead	✓	🚧	⏱
Lakeland Bridge	✓	🚧	🚧
Alpaugh Bridge	✓	🚧	⏱
SR 43 Curved Bridge Overhead	✓	🚧	🚧
Nebraska Overhead	🚧	🚧	⏱
Corcoran Highway Overhead	🚧	🚧	⏱

✓ **COMPLETED/SUBSTANTIALLY COMPLETED** 🚧 **UNDERWAY** ⏱ **PENDING**

Construction Package 2-3

Substantial progress has also been made on Construction Package 2-3 (CP 2-3) since the 2023 PUR. CP 2-3 stretches approximately 65 miles from the end of CP 1 at East American Avenue in Fresno to a mile north of the Tulare-Kern County line. This segment, the largest of the three current construction contracts, includes 48 structures, including 26 grade separations across Fresno, Tulare, and Kings counties, as well as viaducts, underpasses, and overpasses. The project team has resolved several major commercial issues with the design-build contractor, Dragados/Flatiron Joint Venture (DFJV), and is working toward finalizing a revised baseline schedule for the project with a substantial completion date in 2026 consistent with what was published in the PUR.

Despite the historic flooding that impacted several locations within the corridor, in 2023, 5 structures were completed, which significantly enhanced safety and east-west mobility throughout the valley. Additionally, work commenced at 9 new structure locations, including the Cross-Creek Viaduct and the SR-43 Curved Bridge Overhead. By the end of 2023, 16 structures had been completed and 19 structures were underway. Eighty percent (559 out of 701) of utilities have been or are being relocated, and 75 percent of the guideway (65 miles) has been completed or is in progress.

Exhibit 2.4 provides a detailed status of each structure within CP 2-3 and highlights progress to date.

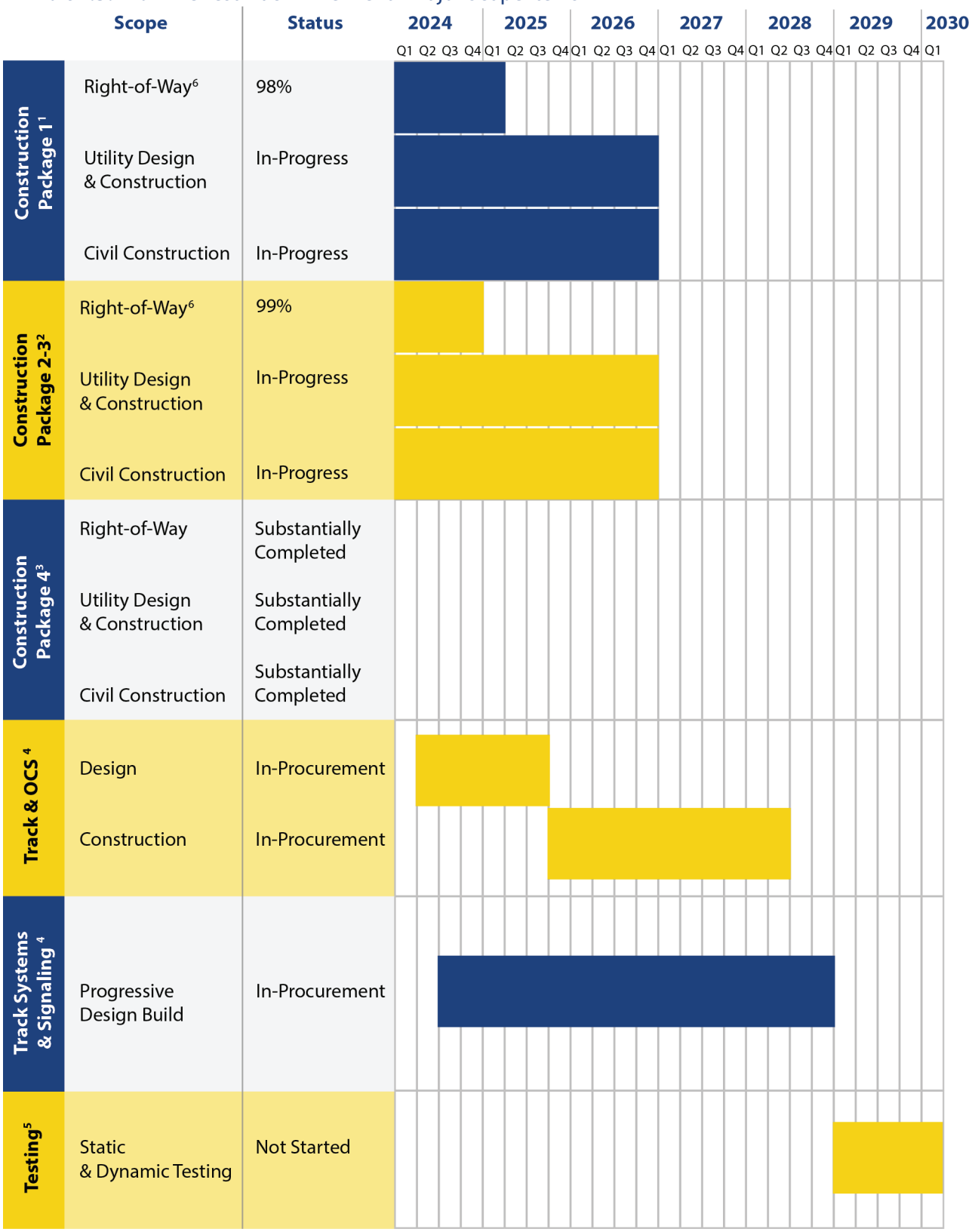
Exhibit 2.5 provides a timeline for accomplishing the major scope items required to be ready for static and dynamic testing on the 119-mile Central Valley test track. It provides a status of key scope elements, reflecting the Authority's first completed construction project, CP-4, and the status of other key activities. The schedule also outlines the timeline for completing the ARRA grant tasks for construction/final design and construction of the first construction segment.

CASE STUDY

Case Study: Fresno Chinatown

With construction ongoing within the Fresno Chinatown community, the Authority is continuing engagement with residents and local small businesses to provide the most up-to-date information on road and traffic notifications. The Authority is also focused on participation in local events such as the Fresno 559 Night Market, where high-speed rail staff participates and provides information on construction progress and station design. In addition, the Authority collaborated with the Fresno Arts Council, City of Fresno, and the Chinatown Fresno Foundation to select a local artist to install a mural that highlights the past and future of the Chinatown community. Future efforts are underway to expand this effort in other parts of Chinatown.

Exhibit 2.5: 119-mile Test Track Timeline for Major Scope Items



Notes:
1. Based on latest approved Revised Baseline Schedule
2. Based on latest conditionally approved Revised Baseline Schedule
3. CP 4 is substantially complete with one area of approximately 400 feet remaining to resolved with a third-party.
4. Dates align with latest Grant Agreement timelines
5. Assumes the two prototype trains arrive for dynamic testing
6. Based on data through February 29, 2024, from the April 11, 2024, Central Valley Status Report

Photo: Tule River Viaduct near Corcoran

Expanding into Merced and Bakersfield

As construction is finalized along the first three construction packages in the Central Valley, the Authority is advancing design for the segments north into Merced and south into Bakersfield. Extending the rail line into downtown Merced and Bakersfield will improve access to other transportation services, benefiting businesses, educational institutions, medical centers, and residents beyond the region. The completion of the corridor will create long-term job opportunities that will drive economic growth and transform the region.

The draft configuration footprint (30 percent design) for the Merced and Bakersfield extensions is complete, with recommendations from value engineering and value analysis workshops being reviewed for incorporation into the final design. Utility relocation design and right-of-way activities are well underway as part of the final design. The recently awarded $3.3 billion in federal grants will greatly contribute to completing the design and expediting construction of the extensions.

The Authority is planning for the next set of construction packages with small-to-medium sized packages, utilizing multiple delivery methods to start construction at multiple locations along the Merced and Bakersfield extensions. Smaller construction packages will provide more contracting opportunities and allow the Authority to strategically complete the design, right-of-way activities, and construction, clearing the way for track construction, system installation, testing, and commissioning. All these efforts are necessary to achieve the goal of passenger service in the Central Valley corridor between 2030 and 2033.

Exhibit 2.6: Merced and Bakersfield Extensions Timeline

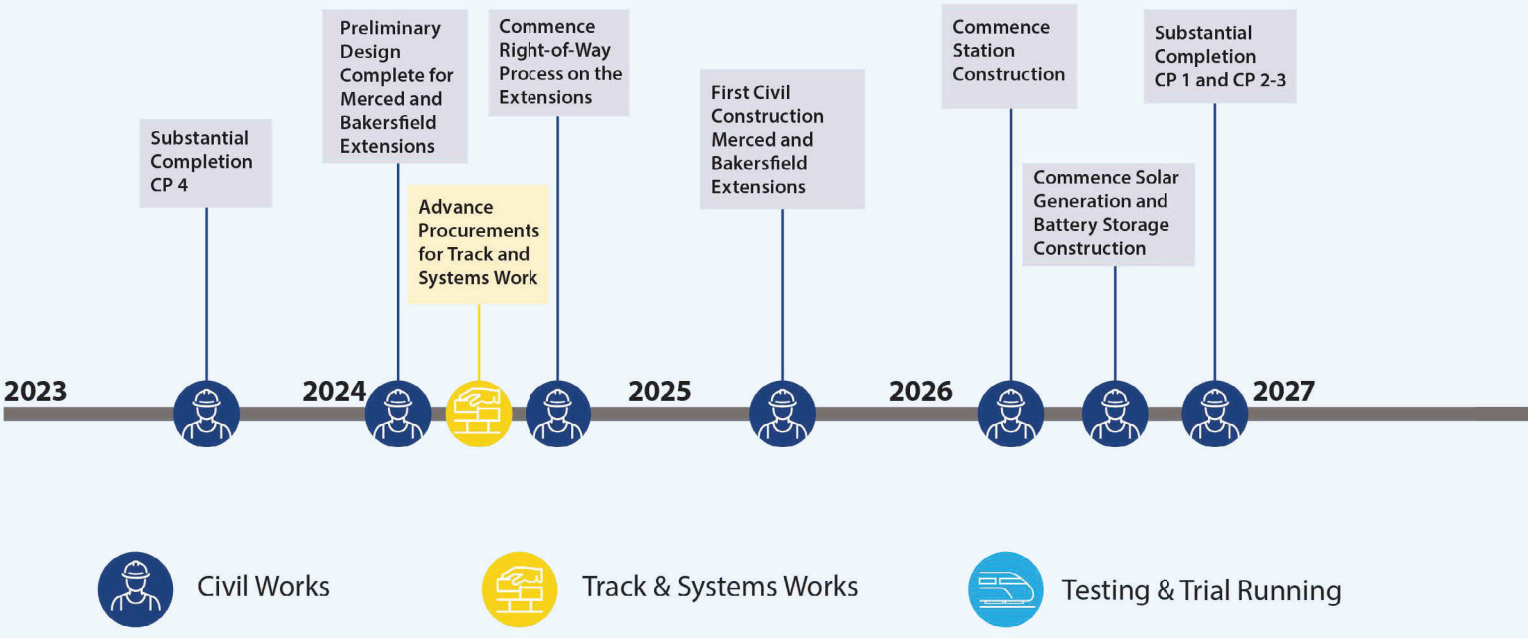
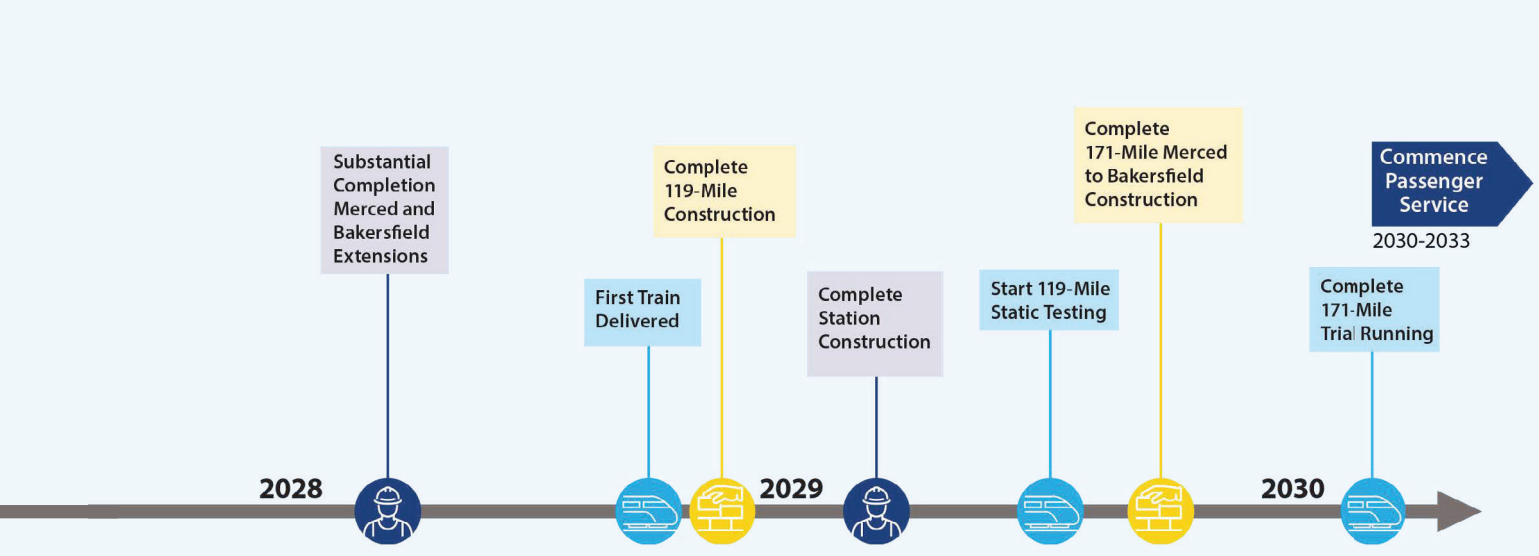

Substantial Completion CP 4
Preliminary Design Complete for Merced and Bakersfield Extensions
Advance Procurements for Track and Systems Work
Commence Right-of-Way Process on the Extensions
First Civil Construction Merced and Bakersfield Extensions
Commence Station Construction
Commence Solar Generation and Battery Storage Construction
Substantial Completion CP 1 and CP 2-3
2023
2024
2025
2026
2027
Civil Works
Track & Systems Works
Testing & Trial Running

Exhibit 2.6 shows the major milestones that lie ahead to deliver the 171-mile electrified high-speed rail system linking Merced, Fresno, and Bakersfield and providing connections to rail and transit systems in Northern and Southern California. With the recent infusion of federal grant dollars, advanced design of extensions to Merced and Bakersfield is now fully funded. With the release of several procurement packages, we are also on track toward delivering passenger rail service beginning between 2030 and 2033. This remains an ambitious schedule, dependent on full funding, and considerable work lies ahead. The project is advancing in partnership with the California State Transportation Agency, the Federal Railroad Administration, the San Joaquin Joint Powers Authority, the San Joaquin Regional Rail Commission, and the California Department of Transportation, along with extensive engagement with communities, stakeholders, and regulatory agencies. The Authority is undergoing the necessary steps to further detail out the schedule for delivering the extensions, testing, and overall project elements such as stations, rolling stock, and rail systems to ensure operations in our schedule window.



Stations

The nation's first high-speed rail stations will be located within the Central Valley in Merced, Fresno, the Kings/Tulare region, and Bakersfield. The Authority has been working with city officials, regional partners, and local stakeholders on early site activation planning, which includes engaging with the communities around future stations to identify improvements and activities that will spur economic growth and a sense of community through temporary and long-term activities at the sites before the stations open. In coordination with S an Joaquin Joint Powers Authority (SJJPA), the Authority is supporting efforts to develop a new station in Madera.

Over the past several years, Authority teams have gathered valuable feedback from Merced, Madera, Fresno, Hanford, Visalia, Bakersfield, and San Joaquin Valley regional residents, as well as jurisdiction officials, transit agencies, and community and public organizations to ensure that station site and area planning is a success.

In October 2022, the Authority Board of Directors awarded a contract to the joint venture of Foster and Partners/Arup (executed in March 2023) for the Merced, Fresno, Kings/Tulare and Bakersfield stations. Following this, pre-design work for the stations commenced, encompassing site investigation, analysis, and urban planning. By November 2023, concept designs for all four stations were completed. These concepts will progress through schematic design and into design drawings in 2024.

> "This grant money — totaling nearly $3.1 billion — is imperative for the high-speed rail project's overall success, but in particular, is critical to the City of Fresno. Part of the money will go toward building our high-speed rail station — the nation's first. This landmark building will make a statement to rail passengers and will be the centerpiece of our downtown revitalization efforts, which are central to my One Fresno vision."
>
> — Jerry Dyer, Fresno Mayor

Rendering: Merced Station Concept

MERCED STATION

The Merced Station location has now been fixed between O and R streets in downtown Merced in a location that enables the integration of high-speed service with that of the Altamont Corridor Express and the Amtrak San Joaquins. Throughout 2023, emphasis was placed on the analysis of site conditions and the development of major station layout elements. This included the incorporation of pedestrian bridges for the safe transit of passengers over the adjacent Union Pacific Railroad tracks, as well as the placement of regional and local bus stops, with this focus on making the passenger journey as seamless and direct as possible. In addition, the City of Merced and the Authority are working together to develop a station area plan that focuses on the station as a mobility hub, and the attendant land uses that can enable the city's vision for economic growth and revitalization in the station area and surrounding community.

> "Investment in California High-Speed Rail is an investment for the City of Merced. We are excited to look to the future and see what high-speed rail and the future Merced Station will bring to our growing city and the connections it will bring residents to the rest of the state."
>
> — Matt Serratto, Merced Mayor

The SJJPA, in coordination with local leaders, is in the process of relocating the existing Madera Station served by San Joaquins rail service to a location near Avenue 12 to better meet regional goals of improving ridership and connectivity. This relocation will allow connectivity with initial high-speed rail service.

FRESNO STATION

The Fresno Station has been the site of extensive community engagement and discussions with the local jurisdiction to best leverage ongoing design work to further the city's goals for enhancing and enriching the downtown area with an explicit linkage to Chinatown. As part of multiple coordination discussions, the station design work has focused on the placement of public plazas and pedestrian bridges, so the station serves as a bridge between Chinatown and Downtown. The functional layout of the station is intended to enable surrounding development while providing a multimodal hub across all types of transit. The station platforms center on Mariposa Street, which is an important historic axis of activity in the city.

The design work has also focused on the scale and layout of plazas to serve as access to the Fresno Historic Train Depot.

In 2023, the Authority was awarded a $20 million Rebuilding American Infrastructure with Sustainability and Equity (RAISE) grant from the Federal Railroad Administration for the renovation of the historic depot to carry out seismic and accessibility retrofits to that building and make it ready for a new occupant. The RAISE grant also funds a downtown plaza that can provide a site of activity in advance of the high-speed rail station construction completion; this site is a prime opportunity for observation of the station construction and train testing, as well as community activities. Work on the area is expected to begin in 2025. The final project element of the RAISE grant in Fresno is a mobility hub on the Chinatown side of the project and is an opportunity to serve the station as well as the adjacent community with electric vehicle charging and other active transportation and mobility services. Part of the December 2023 Fed-State grant funds will also go toward supporting the design and construction of the Fresno Station.

Rendering: Fresno Station Concept

Rendering: Bakersfield Station Concept

KINGS/TULARE STATION

The Kings/Tulare Station provides an opportunity to serve the growing rural cities of Hanford and Visalia, as well as adjacent communities. This is a critical regional station and is being designed to connect regional transit seamlessly to the high-speed rail service. The greatest opportunity for regional connection comes with planning and design for a direct transfer between the Cross Valley and high-speed rail by means of a connection underneath the high-speed rail station viaduct. Bus service and automobile access to the station will come from a new complete street facility off the roundabout at State Route 43 and Lacey Boulevard. The City of Hanford has been actively reviewing the opportunity for bicycle and active transportation connections along the Lacey Boulevard corridor and recently received a grant from Caltrans to further the study of the corridor and Cross Valley rail service.

BAKERSFIELD STATION

The Bakersfield Station reflects the local preference for a station at the edge of the historic downtown. This location, at F Street and State Route 204 near Garces Circle, has been the focus of local planning to envision high-density economic development. The design of the high-speed rail station in Bakersfield has respected that vision and has focused on using the station configuration, an elevated station on a viaduct, as an opportunity to provide a shaded active transportation corridor connected into a world-class station facility.

Throughout 2023, the design team has met with stakeholders from Kern Council of Governments, Caltrans, and the City of Bakersfield to understand the priorities of access to the site and the most logical transit and active transportation connections. A core focus has been ensuring the station enables economic development while seamlessly and effectively connecting transit access and providing safe automobile access. Until fully electrified rail services are complete in Southern California, throughway bus service will be made available for passengers at the Bakersfield station site.

Track and Systems and Trainset Procurements

As markets continue to stabilize in the post-COVID economy, the Authority is making significant progress on major procurements necessary to achieve operations on the 171-mile Early Operating Segment. This year will bring continued progress on procurements necessary to bring passenger service to California in the phased approach outlined in this section.

Procurement Strategy

After extensive industry feedback, study and analysis, the Authority restructured its previous trainsets and track and systems procurements into a multi-phase effort. **Table 2.0** describes the procurement packaging of high-speed rail equipment and systems contracts together with ancillary supporting service contracts. Our new strategy leverages smaller contracts and alternative delivery methods, which increases flexibility, minimizes risk, and better aligns with industry standards. In addition to breaking up the scope of work into multiple packages, the new strategy sets out a deliberate sequence for the various procurements, including trainsets, to meet our schedule for operations.

These contracts will be managed under a series of Notices to Proceed (NTPs), which allow the Authority to be flexible in advancing the work within a constrained budget, while minimizing the risk of contractor claims. These NTPs will be informed by funding, available civil works, environmental constraints, integration, availability of long lead materials, and other influences and constraints on the work. The integrated master schedule will also heavily advise the issuance of the NTPs.

The procurement strategy includes four major high-speed rail equipment and systems packages, as well as supporting service contracts. This procurement strategy was presented as an informational item to the Authority Board of Directors in July 2023.

Table 2.0: Overview of Procurement Strategy and Timeline

Packages	Description	Estimated Timing
Package 1: Track and Overhead Contact System (OCS)* Includes: Track Civil Works, Track Bed, Track and OCS	Package 1A: Design of 171 miles (Merced to Bakersfield) Package 1B: Construction Manager/ General Contractor (CM/GC)	Package 1A: Released November 2023 Package 1B: August 2025
Package 2: Systems* Includes: Signaling, Train Control, Core Communication; Traction Power Systems; Supervisory Control and Data Acquisitions; Solar Photovoltaics; Battery Electric Storage System	Contract for system elements of the 119 miles (Madera to Poplar Ave.) with option to expand to Merced and Bakersfield extensions	2024
Package 3: Trainsets*	Procurement of 6 trainsets – 2 prototypes by 2028 for testing and 4 additional trainsets by end of 2030 for revenue operations	RFQ: Released September 2023 RFP: 2024
Package 4: Depots/Facilities	Packaging and scope of depots/ facilities subject to ongoing discussions	2025
Additional Contracts: Program-Wide Support	■ Independent Cost Estimator ■ Construction Manager* ■ Integration Support* ■ Independent Safety Assessor (ISA)	2024-2025

*Board approval required

TRACK AND OVERHEAD CONTACT SYSTEM (OCS) – PACKAGE 1

The Authority has begun the procurement process for the design of the Track and Overhead Contact Systems, necessary to electrify the trains. In November 2023, the Board approved the release of a Request for Qualifications (RFQ) for Package 1A design services for Track and Overhead Contact Systems (OCS) for the initial 171-mile Merced to Bakersfield segment. The contract encompasses designing the entire track network, which includes not only the train tracks and OCS but also along-track cable containment, across-track ducts, access walkways, fencing, and drainage systems. The placement of the tracks and the accompanying OCS foundation and poles is a significant step in the development of our high-speed rail infrastructure. The procurement for the contractor who will build and install the track and OCS is expected to be issued in 2024.

SYSTEMS – PACKAGE 2

With procurement targeted for 2024, Package 2 will consist of systems design and installation. The scope will include signaling, train control, core communications, traction power systems, solar and battery storage, supervisory control, data acquisitions, solar photovoltaic (PV), and Battery Electric Storage Systems (BESS). It is a single contract with progressive delivery of technically complex elements for the 119-mile segment currently under construction and options to complete extensions into Merced and Bakersfield.

TRAINSETS – PACKAGE 3

The Authority is in the process of procuring six electric trainsets designed for operating speeds of up to 220 mph. The first two trainsets are expected to be delivered in 2028 for testing and trial runs. The remaining four trainsets are scheduled for delivery by the end of 2030.

Rendering: Preliminary train interior concepts, including a family play area, general seating and premium seating

To initiate this procurement process, a Request for Qualifications (RFQ) was issued in August 2023, and the statements of qualifications were submitted (SOQs) in November 2023. The Request for Proposals (RFP) will be released in early 2024. The goal is to award the contract by the end of 2024. This timing enables the Authority to meet its commitments to the Federal Railroad Administration, including conducting dynamic testing by December 2028, to lead to revenue service between 2030 and 2033.

Deutsche-Bahn, the Authority's Early Train Operator, embarked on a year-long effort starting in 2023 to engage community members, stakeholders, disability rights advocates, and the public on the design of the Authority's train interiors. Substantive feedback from groups, including the ADA community and the public across the state, informed early renderings and mock-ups for the official trainset design handbook being created for the ongoing trainset procurement, expected to conclude in 2024.

In September 2023, the Authority released concept designs for train interiors after gathering feedback from project partners and community representatives. The designs include various seat configurations such as long benches, tables, and standard front-facing seats. The trains will incorporate sustainability principles, safety, and the highest mobility standards with various seating and functional zones.

DEPOTS/FACILITIES – PACKAGE 4

Continuing discussions and pre-planning for depots and facilities are underway. When discussions are finalized, this procurement package (or packages) will be initiated. The current timing for procurement is in 2025.

Planning for Operations

As first outlined in the 2023 PUR, the Authority has laid out a business model for interim service in the Merced to Bakersfield corridor following an "infrastructure owner" approach. Under this approach, the capital infrastructure would be leased to a separate public entity to provide passenger service. An element of these discussions is to detail and evaluate the concept of establishing a "universal operator" under the management of the San Joaquin Joint Powers Authority (SJJPA) to operate a set of integrated rail services. Specific sub-agreements are under development, as shown in **Exhibit 2.7**, that are necessary to detail the operating relationships and requirements of each agency for asset leasing and operating cost responsibilities. Agreements would also be required to detail the requirements of a universal operator.

Since the 2023 Project Update Report (PUR), progress has been made in prioritizing and establishing a lead agency for each of the identified agreements. The Authority, SJJPA, and CalSTA are meeting monthly to track procurement progress and refine agreements. We are on target to have both the draft rolling stock lease model agreement and the infrastructure lease model agreement in place by the end of this year. These agreements are progressing in a manner in which we will meet our timeline for revenue service by our 2030 to 2033 schedule window. Updates will be provided in the 2025 Project Update Report.

Exhibit 2.8 illustrates the working relationships under this infrastructure owner business model approach. By way of comparison, the infrastructure owner concept is similar to the San Joaquins current operation: BNSF is the infrastructure owner providing track rights to the SJJPA (public entity), which pays BNSF to use the tracks for passenger service.

Exhibit 2.7: Operators Agreement Timeline

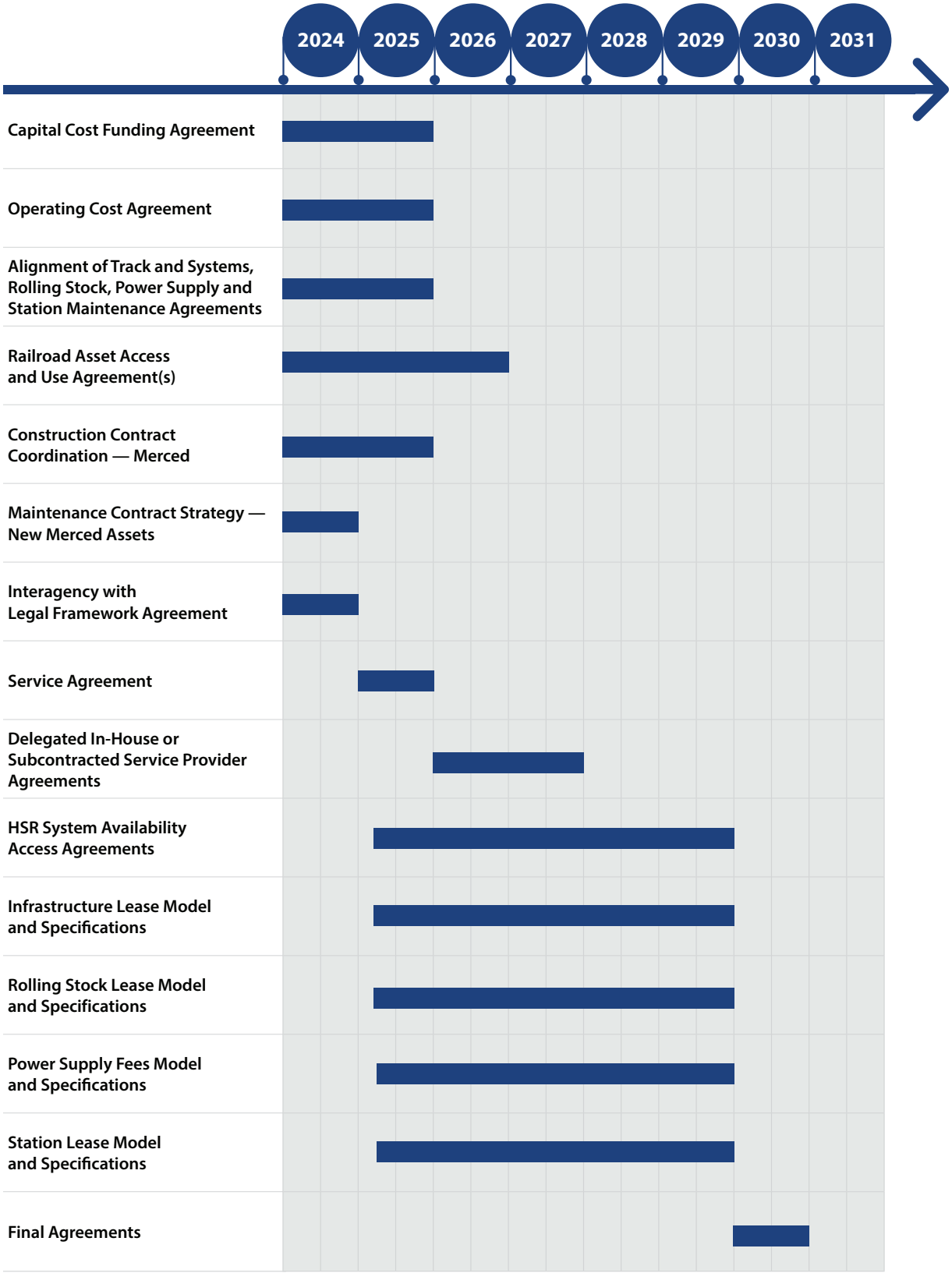
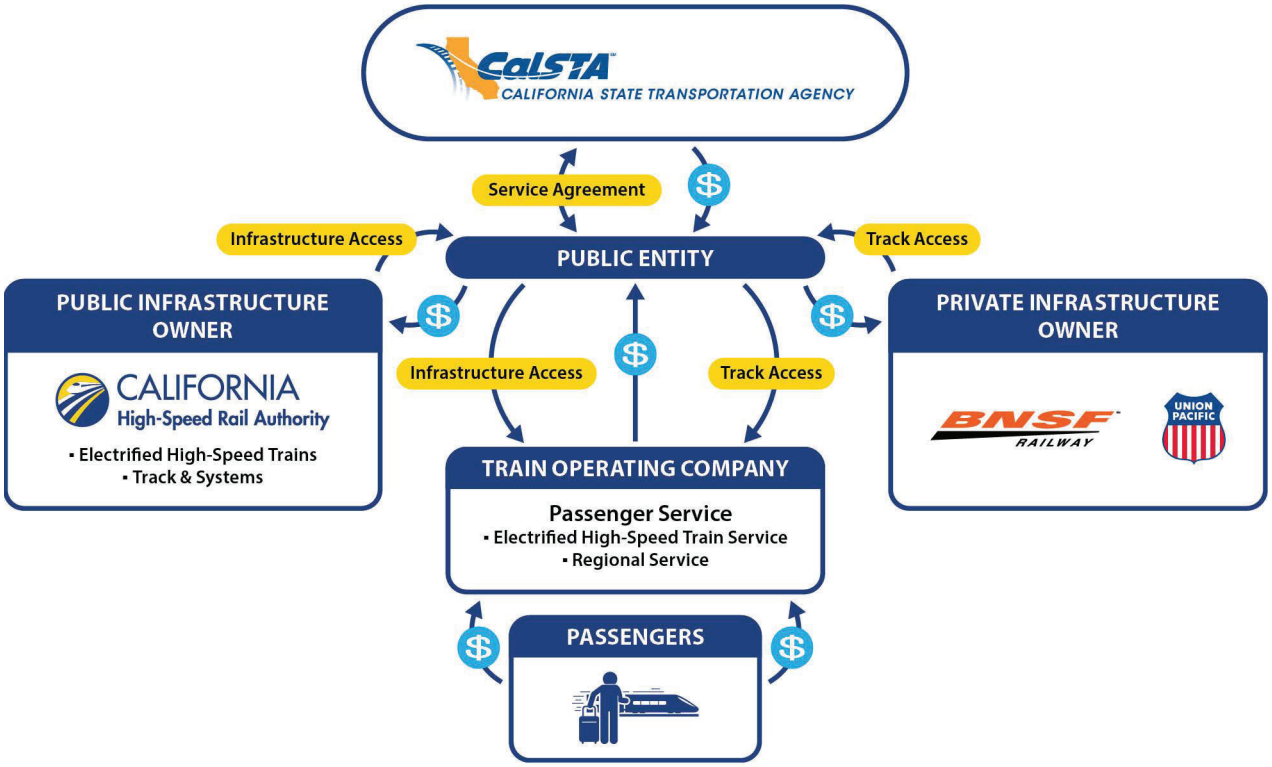


Exhibit 2.8: Early Operating Segment Business Model



"We're excited to work with the High-Speed Rail Authority on the Central Valley Service from Merced to Bakersfield. This will markedly improve service throughout the region and improve connectivity for the entire state."

— Stacey Mortensen, SJJPA Executive Director

CASE STUDY

Case Study: Helping Communities After Record Rains

After record rains in late 2022 and early 2023, the Authority and construction contractor Dragados/Flatiron Joint Venture partnered with state, local agencies, and emergency responders by providing materials, equipment, and technical support to help impacted communities recover from the historic flooding..

These efforts included providing construction equipment to repair breached levees, providing material to raise roadways above the floodwaters, reopening roadways through high-speed rail construction sites to create additional access to communities cut off by floodwaters, diverting water into areas under the control of the Authority to reduce flood risk to communities, and assisting local agencies in closing flooded roads to keep the public safe.

Northern California

STATUS

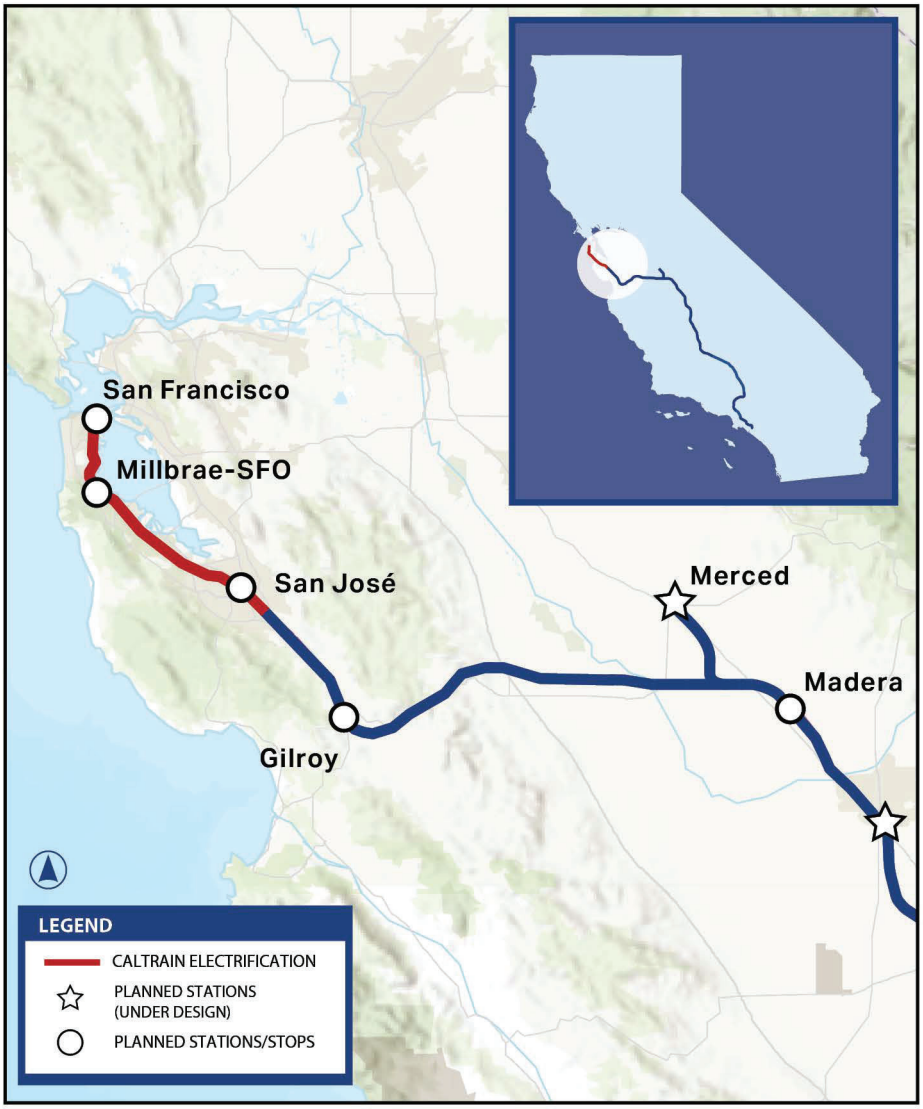
159 miles

100%
Environmentally cleared

Eligible to begin advanced design

Corridor electrification underway on 51 miles through Caltrain Electrification Project

Segment construction is unfunded



GOALS:

- **Advance design work in 2024**
- **Continue to engage with partners on "shared corridor" early capital investments**
- **Develop segment funding plan options**

Northern California

Completing construction in the Central Valley and linking service into Northern California remains a critical step to the success of the high-speed rail program. The Northern California project section spans 159 miles between downtown San Francisco and Merced in the Central Valley. Environmental clearance work In Northern California is complete, and the region is poised to use funding as it becomes available for advanced design.

Work is underway on critical infrastructure projects to integrate high-speed rail with existing transit networks. Caltrain is testing its Electric Multiple Units (EMUs) — electric trains — in anticipation of starting electrified service along its 51-mile corridor in 2024. The Authority has contributed more than $700 million toward the electrification of the Caltrain corridor. High-speed trains will use this infrastructure as part of the blended system when it begins its service on the San Francisco Peninsula. Additional joint-benefit projects and multi-agency partnerships include the Portal (formerly known as the Downtown Extension Project), which will connect the existing rail corridor to downtown San Francisco's Salesforce Transit Center, and the Diridon Integrated Station Concept Plan, which will reimagine Diridon Station in San José as a major intermodal hub.

The Authority is actively pursuing the funding that is necessary to advance the system's design in Northern California and embark on the critical geotechnical investigations in the Pacheco Pass that are essential to completing the connection to the Central Valley. This year, the Authority anticipates engaging on next steps so work can commence as soon as funding is secured.

Rendering: High-speed rail will move through the Pacheco Pass area between San José and Merced

Caltrain Electrification

Caltrain's historic electrification project is the first undertaking in North America in a generation in which diesel trains and their infrastructure components are transitioned to an electrified system. The Authority's $714 million investment in the electrification of Caltrain will prepare the corridor for high-speed rail service while providing immediate benefits to communities along the San Francisco Peninsula, including faster and more frequent Caltrain service starting in 2024.

Electrification will also help meet ambitious regional and state climate action goals by lowering greenhouse gas emissions, improving air quality and relieving traffic congestion. Additionally, electrified service will advance equity along the corridor by reducing noise and air pollution while increasing access for priority equity communities.

The Portal

The Portal (also known as the Downtown Rail Extension) will deliver a nearly 2-mile tunnel and rail extension from the Caltrain 4th and King Station to the Salesforce Transit Center in downtown San Francisco, the northern terminus of the high-speed rail project. The project is led by the Transbay Joint Powers Authority (TJPA), in collaboration with the City and County of San Francisco, Caltrain, Metropolitan Transportation Commission (MTC), San Francisco County Transportation Authority (SFCTA), and the Authority.

The project is expected to enter the engineering phase of the federal Capital Investment Grant program in early 2024 with a planned federal share of more than $4 billion and is currently initiating procurement, planning preconstruction activities like utility relocation, and acquiring the needed right-of-way. In early 2024, the Federal Transit Administration will approve the project's entry to the engineering phase of the federal Capital Investment Grant program, with a planned federal share of close to $4 billion. The project has begun procurement for its major construction contracts and is starting the process of acquiring the needed right-of-way. When complete, the project will connect high-speed rail passengers and communities in downtown San Francisco with 10 other Bay Area transit operators.

San José Diridon Station

The partners involved in the San José Diridon Station project, including the Authority, Caltrain, the Metropolitan Transportation Commission (MTC), Santa Clara Valley Transportation Authority (VTA), and the City of San José, have been working to develop a station plan that will accommodate increased transit service from high-speed rail, Bay Area Rapid Transit (BART), Caltrain, and the other transit providers who serve the station.

The partners are currently advancing a business case for a suite of projects at the station to determine the necessary improvements and modifications to accommodate the increased

Photo: Caltrain has begun testing the electrified track with service estimated to begin in fall 2024

transit service. Once the concept is refined and the benefits and costs are assessed in more detail, the environmental clearance process can begin.

Gilroy Station

The Authority is planning for a high-speed rail station at the Gilroy Caltrain station. The station will be a key rail connection to the Central California coast via planned new regional rail service to Monterey and Salinas. The Authority is working closely with the City of Gilroy on station area planning and held several workshops in 2023 focused on transit and land-use goals for the area.

Union Pacific Rail Corridor

The Authority is engaging with the Union Pacific Railroad for the use and upgrade of the existing rail corridor between San José and Gilroy, which Union Pacific owns. The Authority's plans for the corridor would add electrified passenger rail tracks for high-speed rail and Caltrain service, while maintaining and improving the freight infrastructure for Union Pacific to serve its customers. In 2024, the Authority will continue to engage with Union Pacific to advance the necessary agreements for use of the corridor.

Regional Grade Separation Projects

Grade separation projects – roadways that realign traffic over or under a railway to eliminate hazards – led by local jurisdictions in collaboration with rail agencies are progressing. The first Authority-funded infrastructure in Northern California, the 25th Avenue grade separation project, was completed in 2021. California's 2022/2023 State Budget invested $350 million in grade separations statewide, and more than $100 million of which went to high-priority projects in the Caltrain corridor. Currently, Caltrain is working with local jurisdictions and funding partners on a Corridor Crossings Strategy. The goal of the effort is to develop a corridor-wide approach to grade separation and/or rail crossing closure projects to elevate their importance in infrastructure funding as a shared regional responsibility. The Authority has participated in the corridor crossing strategy initiative.

Litigation and Challenges

In Northern California, three lawsuits were filed against the San Francisco to San José project section's EIR/EIS, all of which have had stay agreements executed. This is allowing the Authority to work collaboratively with the litigants to resolve the issues raised. For the San José to Merced Project section, two tolling agreements have been entered to allow the Authority to work with the relevant stakeholders and avoid litigation.

> "High-speed rail will change travel in the state of California. It will better connect those of us in San Francisco, the Peninsula, and San José with the Central Valley and Los Angeles. Connecting these major economic regions with fast, efficient high-speed rail will foster more equitable employment and housing opportunities."
>
> — London Breed,
> San Francisco Mayor

Southern California

STATUS

164 miles

56%

92 miles environmentally cleared in 2022, with the 41 miles from Palmdale to Burbank cleared by Summer 2024

Advanced design could begin in 2024

Bookend projects advancing; continuing environmental in 2024

Segment construction is unfunded

GOALS:

- Complete environmental review
- Begin advanced design
- Identify "shared corridor" early capital investments
- Develop segment funding plan options
- Establish connection point with emerging Brightline service

Southern California

The Southern California segment of the high-speed rail project encompasses a 164-mile stretch from Bakersfield to Anaheim. Environmental progress continues in the region, with 56 percent already cleared and the 41-mile Palmdale to Burbank section anticipated to come before the Board for approval in the second quarter of 2024.

The Southern California segment is advancing with a focus on regional connectivity and infrastructure enhancement. Recent progress includes funding key early investment projects, achieving environmental clearance milestones, and progressing on grade separation projects to improve safety and traffic flow. Particularly notable is the ongoing collaboration with cities, including Palmdale, for integrated station planning, addressing civic and environmental considerations, and securing funds for the design and construction phases.

The Palmdale to Burbank project section will consist of an entirely new rail line, mostly built in tunnels, resulting in a trip in as little as 13 minutes between Palmdale and the Burbank airport. The new route will provide opportunities for economic development as well as connections to many destinations and transportation and housing options. Regional plans include potential for high-speed rail connections to Brightline West via the High Desert Corridor route from Palmdale to Apple Valley, with the line ending in Las Vegas.

The final segment between Los Angeles and Anaheim, needed to complete the full 494-mile environmental review for Phase 1, is anticipated to be complete by the end of 2025.

CASE STUDY

Case Study: Record Stakeholder and Community Outreach

The Authority hosted and participated in a record number of outreach events in 2023, reaching thousands of future high-speed rail riders. These events included hosting the American Planning Association Conference in Fresno, the first annual Small Business Diversity Day event, an industry outreach forum previewing upcoming procurements, and the 2023 Train Fest held at the Los Angeles Union Station.

At the 2023 Train Fest, thousands of people gathered to explore and learn about trains, including future train plans for Union Station and high-speed rail alignment. Staff highlighted progress on finalizing environmental work for the Palmdale to Burbank section of the high-speed rail, which will connect San Francisco with Los Angeles at speeds of up to 220 mph. The introduction of high-speed rail is expected to significantly decrease travel time, making it a game changer for commuters and travelers.

Bakersfield to Palmdale

In 2021, we reached a significant milestone in the Bakersfield to Palmdale section by finalizing the Record of Decision (ROD) and Notice of Determination (NOD). We are in active dialogue with an environmental stakeholder under a tolling agreement on this segment.

The Palmdale Station achieved environmental clearance in 2021 with the ROD/NOD for Bakersfield to Palmdale. The Authority has been working with the city to develop a strategy for an integrated station master plan, building on the City of Palmdale's station area planning. Our aim is to create a successful master plan that includes thoughts on regional corridor planning, community hubs, and an efficient transit network. This involves advancing and refining the approved station footprint, creating a common vision, establishing lasting partnerships, and developing an effective station area governance structure.

The city and the Authority executed an agreement to work cooperatively toward this goal and are actively seeking funding for the Palmdale Station Master Plan. We are also exploring grant opportunities to support station planning efforts in Palmdale, including the development of a multimodal transportation hub that will connect high-speed rail, Metrolink, Brightline West, Amtrak, future light rail, Greyhound bus service, and other local transit options.

Palmdale to Burbank

The Palmdale to Burbank project section, primarily constructed through tunnels, will reduce travel time to as little as 13 minutes between Palmdale and the Burbank airport. Beyond facilitating rapid transit, the route opens doors for economic development and connects various destinations and transportation modes. Furthermore, regional plans are considering the integration of high-speed rail connections to Brightline West through the High Desert Corridor, extending from Palmdale to Apple Valley, with the line ending in Las Vegas.

The Draft EIR/EIS for the Palmdale to Burbank project was released in the fall of 2022, with an Administrative Final EIR/EIS released at the end of 2023 for cooperating agency review. The ROD/NOD is expected in 2024.

Burbank to Los Angeles

In 2022, we successfully completed the ROD/NOD for the Burbank to Los Angeles project section. Our focus remains on delivering a transformative transportation option that prioritizes the needs of the community and promotes environmental stewardship.

This section contains the only direct connection to an airport in the entire alignment. The approximately 14-mile project section will utilize the existing railroad right-of-way to the greatest extent possible, adjacent to the Los Angeles River, through the cities of Burbank, Glendale, and Los Angeles. The new line will be an integral part of Southern California's Urban Rail Corridor, providing a link between Los Angeles and the statewide transportation network.

In 2023, a lawsuit was settled with the Burbank-Glendale-Pasadena Airport Authority, clearing a path to begin work, which will include a station ideally with direct access to the airport.

Los Angeles to Anaheim

The Los Angeles to Anaheim project section reached an important milestone in the environmental process in November 2023 with the consideration of an improved project alternative.

In 2020, the Authority conducted a revised scoping process to propose two new project components, the BNSF Colton Intermodal Facility (IMF) and BNSF's Lenwood Staging Tracks. The Colton IMF accommodated the future growth of passenger rail operations on dedicated passenger tracks and reduced the project's potential impacts on freight rail by shifting some freight operations outside the project corridor.

As a result of comments received during public scoping, subsequent meetings with partner agencies and key stakeholders, the Authority prepared a Supplemental Alternatives Analysis (SAA) to evaluate a new alternative that would eliminate the need for a new BNSF IMF in San Bernardino County.

The SAA considers three new build alternatives that do not include an IMF and proposes to advance the Shared Passenger Track Alternative for further consideration in the EIR/EIS. The Shared Passenger Track Alternative generally resembles the current 2018 High-Speed Rail Project Alternative and, among the new alternatives studied in this SAA, may better meet the project's purpose and need by serving the most potential passengers in the most cost-effective manner, while also reducing impacts to the environment, existing rail operations, and communities.

The Authority has committed to environmentally clearing the Los Angeles to Anaheim project section by December 2025.

Partnering to Build

In preparation for operations of high-speed rail into the Southern California region, the Authority continues to work collaboratively with regional rail and transit partners. Improvements within the Burbank to Los Angeles and Los Angeles to Anaheim project sections add the potential for efficiencies to all passenger operators, including Metrolink, Amtrak, and LOSSAN Corridor.

In Antelope Valley, the High Desert Corridor project, under the leadership of the High Desert Corridor Joint Powers Authority, is in the final stage of the environmental clearance process, with potential clearance by the end of 2024. The 54-mile project connecting high desert communities across Los Angeles and San Bernardino counties will eventually connect with the California High-Speed Rail system and Brightline West at Palmdale and Victorville. It could provide a one-seat high-speed rail connection between San Francisco and the Central Valley to Las Vegas, as well as to Los Angeles Union Station and Las Vegas via Palmdale. In December 2023, Brightline West was awarded $3 billion in federal funding from the Bipartisan Infrastructure Law for the 218-mile system connecting Las Vegas and Southern California along the Interstate 15 alignment at speeds up to 186 miles per hour.

LINKUS PARTNERSHIP

The LinkUS project proposes to revolutionize rail travel in Los Angeles. New run-through tracks on an elevated railyard would improve operations, expand capacity, and clear the way for the arrival of high-speed rail at LA Union Station, with connections to Metro, Metrolink, and Amtrak services all in the heart of Los Angeles. The LinkUS project also envisions a new concourse for shorter wait times and a better transfer experience.

In partnership with LA Metro, the Authority committed $423 million to upgrade tracks leading into Union Station.

In June 2023, LA Metro informed the Authority of a significant budget shortfall. Pursuant to the funding agreement executed in 2022, LA Metro and the Authority are working to identify opportunities to optimize the design and construction process for the LA Union Station project and in 2024 will consider how to proceed.

> "We look forward to continuing our collaboration with the Authority to advance our shared goal of improving intercity mobility, ensuring continued state investment in Southern California's regional rail system, and building a more environmentally sustainable California."
>
> — Stephanie Wiggins, LA Metro Chief Executive Officer

Rendering: LA Union Station

ROSECRANS AVENUE AND MARQUARDT AVENUE GRADE SEPARATION PROJECT

LA Metro's Rosecrans Avenue and Marquardt Avenue grade separation project is already improving road safety and efficiency. The Santa Fe Springs project, funded in part with more than $76 million from the Authority, opened the Rosecrans Avenue bridge portion of the project for vehicle and pedestrian traffic in January 2024.

In 2016, the Rosecrans/Marquardt intersection had 26 incidents, five fatalities, and six injuries, according to the California Public Utilities Commission and the intersection was once deemed the most hazardous at-grade railroad crossing in California. With the new bridge in place over the railroad tracks, the intersection is safer for drivers and pedestrians. In addition, vehicles will no longer spend hours each week idling at the intersection while safety gates are down, which will lower greenhouse gas emissions in an area already impacted by air poor air quality.

Construction will be fully complete on the project in 2025.

Photo: Rosecrans Avenue and Marquardt Avenue grade separation (before)

Photo: Rosecrans Avenue and Marquardt Avenue grade separation (under construction)

Photo: San Joaquin River Viaduct

CHAPTER 3:
FUNDING THE PROGRAM

Introduction

In 2023, we saw great improvement in the program's overall funding picture. The Authority received federal grants totaling $3.3 billion toward its goal of securing $8 billion in federal funds over the next five years. These grants enable the Authority to advance the Early Operating Segment in the Central Valley. Specifically, the grants cover costs for a new downtown Fresno station, new state-of-the-art electric trains, final design and right-of-way acquisition for the Merced and Bakersfield extensions, and construction costs to extend our work into Bakersfield, including important grade separation safety projects in the City of Shafter. The year 2023 was a banner year when it comes to welcoming back our federal partner, and it portends good things for the future of this project.

The restored federal partnership also provides an opportunity for the Authority to work with the California Legislature to stabilize the long-term funding dedicated to this project. A megaproject that will take years to construct and is built to operate for decades cannot be fully realized if its only ongoing funding source expires in 2030. As noted in the previous chapter, this is a complex, statewide project that is being advanced in three distinct regions of the state: an Early Operating Segment commencing in the Central Valley, and the goal of completing the Northern and Southern California segments as soon as possible. The federal government has endorsed our plan to advance this project as we have proposed to build it. In California, we need to meet that endorsement with a renewed effort to stabilize long-term funding to see this transformative project through.

Funding Program Update

Given the evolving funding situation, the Authority's Board has adopted and modified a program baseline budget that employs an incremental approach to fund the highest-priority work as funding is identified. The California Legislature directed, in Senate Bill 198 of 2022, that the 171-mile Merced to Bakersfield segment be the first building block for completion, and that it be built as a two-track electrified system. Since the issuance of the 2023 PUR, cost estimates for the Central Valley work on the project remain unchanged; however, the Authority continues to monitor risks to budget for each of the construction packages as discussed in detail in Chapter 4.

The Authority's Board of Directors recently augmented the program baseline budget for new federal grants received in 2023, including the $202 million CRISI grant award in September 2023 and the $3.1 billion Fed-State grant award in December 2023. In January, the Board adopted a revised program baseline budget, which enables us to put those federal funds to work as soon as possible. In fact, the Authority is preparing trainset and track and systems procurements for Board consideration in the coming months to allocate that funding and advance the program — and put more people to work — as quickly as possible.

Table 3.0 shows the adopted program baseline budget, including the recent federal grant awards.

The program baseline budget will continue to evolve as new federal grants are received and the Authority advances new contracts.

"To put all of this in perspective, this project in California is the most ambitious rail project in the entire Western Hemisphere. It's expected to carry 31 million passengers a year, will be 100 percent powered by renewable energy, and, once again, this project is about jobs. It's already created 12,000 good-paying union construction jobs, with thousands more to come."

— President Joseph Biden Jr.

Table 3.0: Program Baseline Budget ($ in Millions)

Scope	Amount	Notes
Central Valley Segment (CVS) Civil Construction: CP 1, CP 2-3, and CP 4	12,455	Civil works for 119 miles from Madera to Poplar Avenue, including SR-99 and SR-46 projects
CVS Track and Systems, Trainset Certification Facility, and Fresno Historic Depot	3,813	Single track and related systems on 119 miles from Madera to Poplar Avenue, high-speed rail trainset certification facility, and Fresno Historic Depot
Project Development and Advance Design	1,043	Phase 1 environmental clearance and advance design
Program Management & Support	2,732	Program management support for planning and construction activities
Bookend Investments	1,298	Caltrain electrification, San Mateo grade separation, Rosecrans/Marquardt grade separation, Union station
Program Contingencies and Reserves	618	Unallocated contingency, interim use, project reserve
Subtotal with 2023 PUR Adjustments	**21,960**	**Subtotal Without New Federal Grants Scopes**
Federal-State Partnership for Intercity Rail Grant Award Scope	3,842	Scope of $3.074B FSP-National grant award (high-speed rail trainsets, trainset facilities construction, Fresno station construction, Merced and Bakersfield extensions final design and ROW acquisition, and Bakersfield interim extension civil works and track and systems construction)
CRISI Grant Award Scope	292	Scope of $202M CRISI grant award for Shafter grade separation projects
RAISE Grant for Fresno Historic Depot	0	No net budget change, but reflect award of $20M grant
Corridor ID Grant	0	No net budget change, but reflect award of $500K grant
Grant Total	**26,094**	**New Program Baseline Budget**

Note: Totals may not sum due to independent rounding

Current Funding

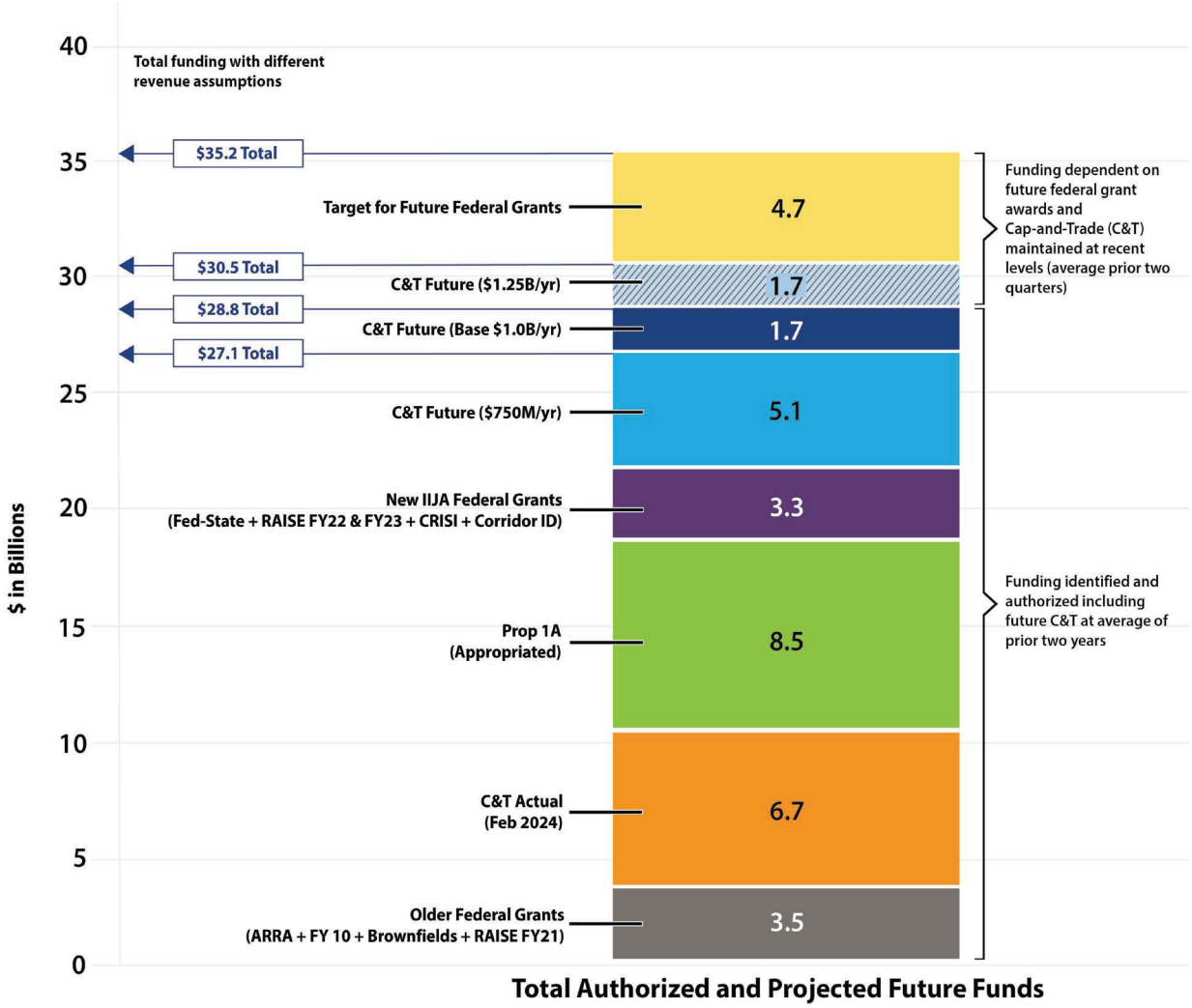
This section provides an overview of the current and projected funding available to the program through 2030, as shown in **Table 3.1** and **Exhibit 3.0**. The total amount of identified revenue for the capital program is currently estimated in the range of $27.1 billion to $30.5 billion, assuming Cap-and-Trade annual revenue scenarios of $750 million and $1.25 billion per year through 2030, respectively.

Table 3.1: Summary of Total Funding Available and Total Funds Expended ($ in Billions)

Funding Source	Total Funding A	Total Expended* B	Total Remaining** C = A - B
Federal Funds			
ARRA Grant: Construction	2.1	2.1	0.0
ARRA Grant: Planning	0.5	0.5	0.0
FY10 + Brownfields + RAISE FY21 Grants	1.0	0.0	1.0
New IIJA Federal Grants (Fed-State + RAISE FY22 & FY23 + CRISI FY23 + Corridor ID)	3.3	0.0	3.3
State Funds			
Proposition 1A Project Development	0.6	0.6	0.0
Proposition 1A Central Valley Segment Construction	6.8	4.3	2.5
Proposition 1A Bookends	1.1	0.5	0.6
Cap-and-Trade (Received through February 2024)	6.7	3.7	3.1
Subtotal	22.1	11.7	10.4
Future Cap-and-Trade***	6.8	0.0	6.8
Total	**28.8**	**11.7**	**17.1**

Note: Totals, through December 31st, 2023, may not sum due to independent rounding.
*Excludes administration and other state operations expenditures
**A portion of this funding may be directed to administration and state operations
*** Future Cap-and-Trade funding assumes a range of $750 million to $1.25 billion per year; the midpoint of $1.0 billion is used here

Exhibit 3.0: Currently Available, Authorized, and Future Funding



*Totals may not sum due to independent rounding
**Portion of future C&T revenues may be used to fund admin support activities
***Portion of Prop 1A may be used to fund admin support activities

Proposition 1A

In 2008, California voters approved Proposition 1A, a $9.95 billion general obligation bond measure with $9.0 billion of total funding directed to high-speed rail. In 2022, the California Legislature appropriated the final portion of Proposition 1A funds, consisting of $4.2 billion in bond funds directed to complete delivery of the 119-mile Central Valley Early Operating Segment. Appropriating the remaining bond funds to their intended purpose of project construction provides several crucial benefits by expanding the labor workforce on the project, providing funds for cash flow needs, and allowing the Authority to use the more flexible Cap-and-Trade funds for other program priorities over time, including matching new federal funds.

Most Proposition 1A funds are expected to be fully expended by the end of 2024-25, with only funds directed to Southern California bookend projects and administrative costs remaining to be expended.

General Fund

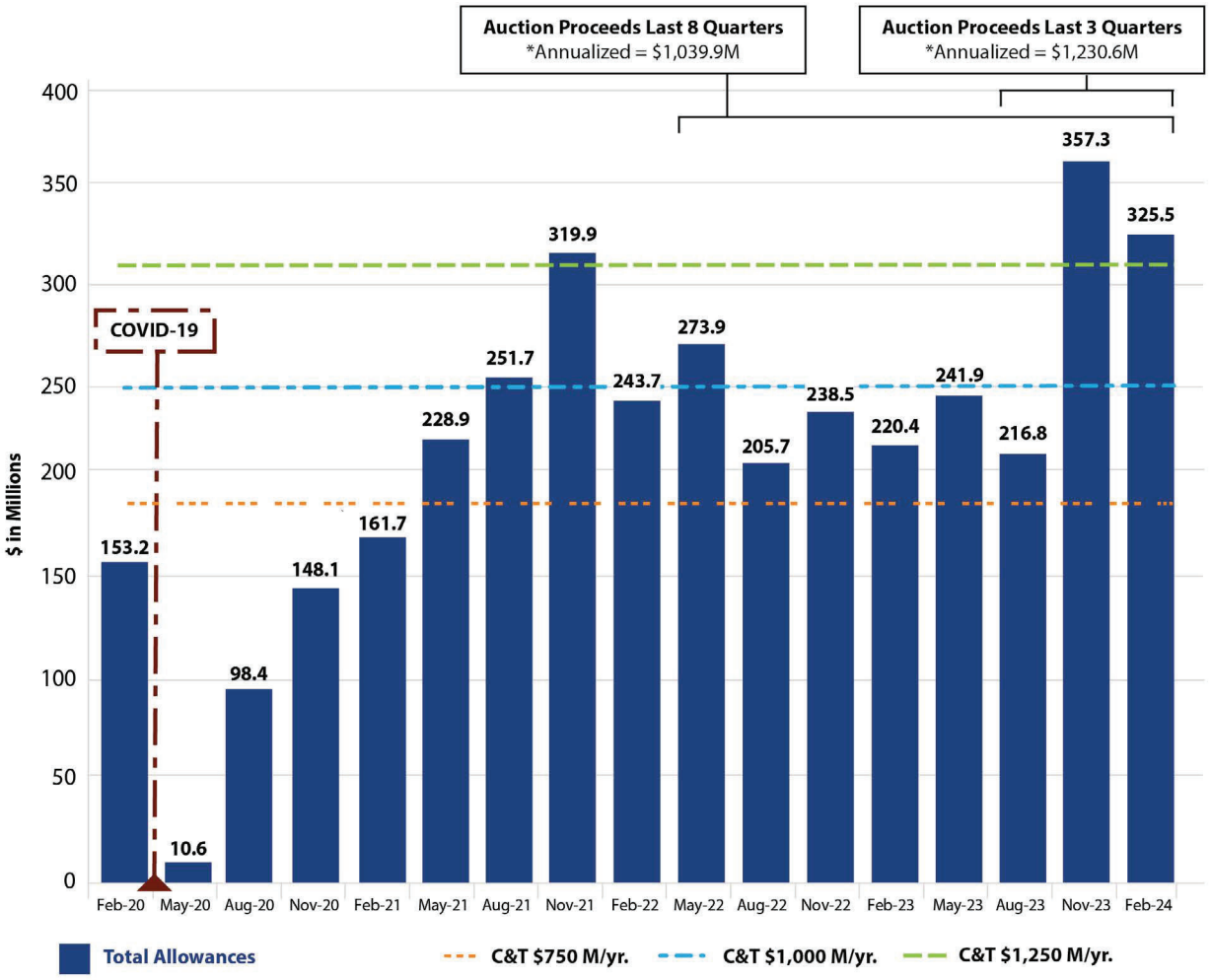
The General Fund does not currently provide direct funding support to the Authority. In times of budget surpluses, the State Constitution suggests infrastructure investments are an appropriate expenditure of one-time, or limited-term, state funds. For instance, in the FY 2022/23 and 2023/24 budgets, General Fund dollars were directed to transit operations and capital, as well as other transportation purposes, but none of this funding was directed to the Authority. The General Fund does support bond debt service on general obligation bonds, including Proposition 1A.

Cap-and-Trade

In 2014, the Authority received a continuous appropriation of 25 percent of specified Cap-and-Trade revenues. The Cap-and-Trade Program is a key element of California's climate plan in which the state sets a limit, or cap, on statewide sources that are responsible for 85 percent of California's greenhouse gas (GHG) emissions. Cap-and-Trade is a market-based policy in which the state sets a cap on emissions and then creates a financial market in which companies can purchase or trade permits or "allowances" to emit those gases. The program drives long-term investment in cleaner fuels and more efficient use of energy, spurring technological innovation and investments in clean energy. The California Air Resources Board administers the program and the revenues generated through the program.

As shown in **Exhibit 3.1**, the last three auctions have yielded $1.231 billion on an annualized basis, while the last four auctions have yielded $1.141 billion in Cap-and-Trade total revenues for the Authority. Since May 2022, the annualized average has been about $1.040 billion. Through the February 2024 auction, the Authority has received a total of $6.856 billion in Cap-and-Trade auction funds, including one-time appropriations. The Cap-and-Trade market shows proceeds over the past 30 months coming in near the top of the annual revenue range of $750 million to $1.0 billion the Authority used in the 2023 PUR. Demand for allowances in recent years and resulting current and future prices indicate a market expectation that allowance settlement prices will continue to be high through 2030. This indicates that Cap-and-Trade revenues for the Authority should be strong for the long term and provide significant contributions to current and future program build out, as well as provide state match funding for new federal grants. However, as the COVID-19 pandemic demonstrated, the market is susceptible to shocks that can cause significant revenue fluctuations until stability returns and unsold allowances are sold.

Exhibit 3.1: Quarterly Cap-and-Trade Auction Proceeds for High-Speed Rail ($ in Millions)



*Annualized after adjusting to reflect AB 398 set-asides for the Department of Forestry and Fire Protection and the Manufacturers Tax Credit and SB 155 for Forest Health and Fire Prevention.

Federal Funding

The Authority has long planned for a significant share of program funding that would come from the federal government due to the history of federal participation in "national scale" transportation infrastructure. Most high-speed rail systems around the world have the national government as the primary direct funder and "generator" of revenues through financing. At the time Proposition 1A was approved by voters in 2008, the Authority targeted up to 50 percent of program funding from the federal government.

Both the Obama-Biden and Biden-Harris administrations have been supportive of high-speed rail generally and the California project specifically. During each of those administrations, Congress stepped up with a significant one-time infusion of rail funding. The grants received by the Authority are described below.

During the Obama-Biden Administration, Congress passed the American Recovery and Reinvestment Act of 2009 (ARRA), which provided $8 billion in national funding for high-performance rail. This was followed by an augmentation from the Fiscal Year 2010 (FY10) federal budget. The Authority has received approximately $3.5 billion in federal grants from these two programs to complete environmental review for the Phase 1 system and construct the 119-mile Central Valley Segment between Madera and Poplar Avenue during this period. Of this, $2.5 billion was from ARRA and $929 million was from FY10.

This early federal partnership was instrumental in enabling California to advance the program to construction. The $2.5 billion in ARRA funding was fully expended before the statutory deadline and in compliance with the Authority's grant agreement with the Federal Railroad Administration (FRA).

Per the terms of the federal grant agreement, the $929 million of FY10 funds, along with $360 million of state matching funds, are scheduled to be the last funding required to complete the federal grant scope of work. The Authority and FRA have agreed on a new "Period of Performance" for ARRA and FY10 grant scope concluding in December 2028.

During the Biden-Harris Administration, Congress passed the Infrastructure Investment and Jobs Act (IIJA), also known as the Bipartisan Infrastructure Law (BIL), which provided several hundred billion dollars of new transportation infrastructure funds. The Authority has received approximately $3.3 billion in federal funding grants for the program as follows:

- $24 million from a 2021 Rebuilding American Infrastructure with Sustainability and Equity (RAISE) grant for State Route 46 safety improvements in and around the City of Wasco near new high-speed rail infrastructure
- $25 million from a 2022 RAISE grant for the Madera to Merced configuration-level design contract to prepare that section for construction
- $20 million from a 2023 RAISE grant for the Fresno Historic Depot Project that is part of the Fresno High-Speed Rail Station

- $202 million from the 2023 CRISI grant for construction of six grade separations in the City of Shafter that are needed for high-speed rail
- $0.5 million from the Corridor Identification and Development Program to develop the Phase 1 San Francisco to Los Angeles/Anaheim service development plan
- $3.1 billion from the 2023 Fed-State grant for critical elements of the Merced, Fresno, and Bakersfield Early Operating Segment

This substantial funding reflects the priorities of the Biden-Harris Administration, and it reflects our strong partnership with the administration. This project achieves the policy objectives important to the administration in terms of environmental, economic, mobility, and equity goals. With this continued partnership, the federal government has invested in scope beyond the 119-mile segment currently under construction, and it has embraced the Merced to Bakersfield 171-mile high-speed segment. The Bipartisan Infrastructure Law is a five-year program, and only two years of the five years are complete. The future funding section of this chapter discusses what grant opportunities remain from the BIL and beyond.

A preferred approach is, of course, to stabilize all requisite funding for the statutorily articulated highest priority of completing the Merced-Bakersfield initial operating segment, and then advancing the work as aggressively as possible. However, until the funding picture can be completed, the Authority will advance through this building-block approach.

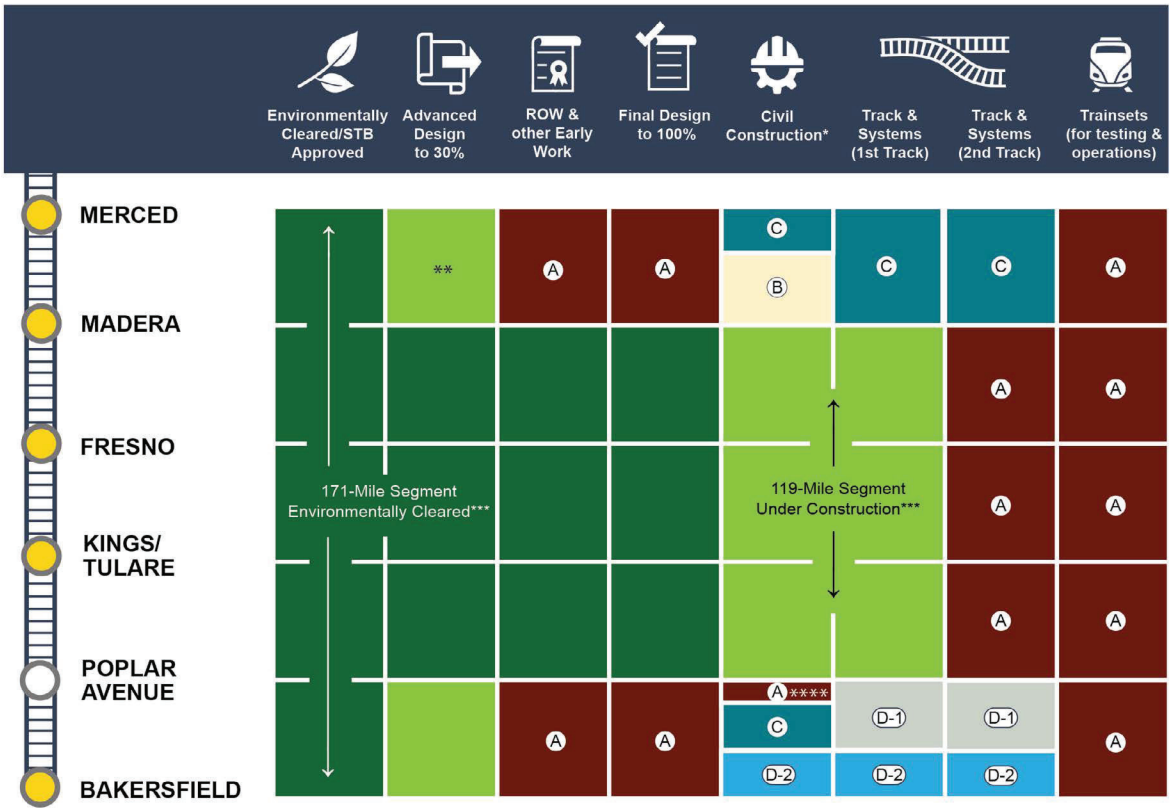
The 119-mile Central Valley segment and bookend projects are funded, and most are under construction. The Merced to Bakersfield Early Operating Segment can now be completed as a two-track railroad with future Cap-and-Trade funds, new federal grants, and whatever new state funds are identified and dedicated to fill any gaps.

Advancing design on all Phase 1 segments as clearance is achieved, and making early investments in shared corridors, can be accomplished with future federal funds matched by other state funds and with local funds. As the Authority's funding sources are subject to fluctuation, the level of future federal grants and Cap-and-Trade proceeds will be better known over time. Our strategy accommodates this variability and focuses on delivering the highest priority elements first while planning to deliver subsequent investments as funds become available.

ADVANCEMENTS ON FUNDING FOR MERCED TO BAKERSFIELD

What a difference a year makes! The Authority, in collaboration with the Federal Railroad Administration (FRA), identified potential federal funds for specific project components, creating a path to apply for grants. **Exhibit 3.2** (2023 PUR) highlights funding gaps.

Exhibit 3.2: Merced to Bakersfield Phasing Approach for Federal Grants (2023 PUR)



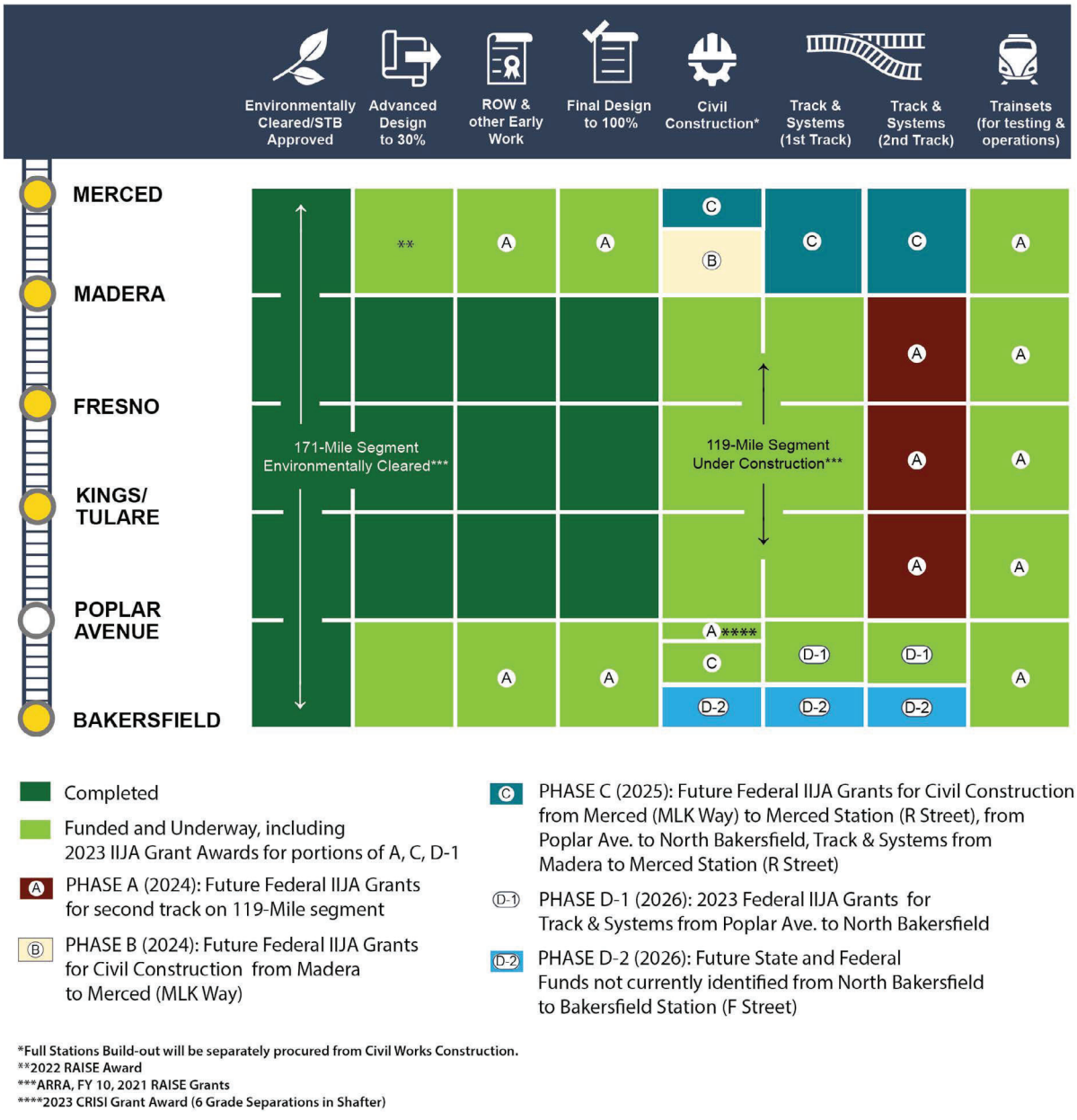
- Completed
- Funded and Underway, including 2023 IIJA Grant Awards for portions of A, C, D-1
- (A) PHASE A (2024): Future Federal IIJA Grants for second track on 119-Mile segment
- (B) PHASE B (2024): Future Federal IIJA Grants for Civil Construction from Madera to Merced (MLK Way)
- (C) PHASE C (2025): Future Federal IIJA Grants for Civil Construction from Merced (MLK Way) to Merced Station (R Street), from Poplar Ave. to North Bakersfield, Track & Systems from Madera to Merced Station (R Street)
- (D-1) PHASE D-1 (2026): 2023 Federal IIJA Grants for Track & Systems from Poplar Ave. to North Bakersfield
- (D-2) PHASE D-2 (2026): Future State and Federal Funds not currently identified from North Bakersfield to Bakersfield Station (F Street)

*Full Stations Build-out will be separately procured from Civil Works Construction.
**2022 RAISE Award
***ARRA, FY 10, 2021 RAISE Grants
****2023 CRISI Grant Award (6 Grade Separations in Shafter)

SIGNIFICANT PROGRESS SINCE 2023 PROJECT UPDATE REPORT

Since the publication of the 2023 PUR, the Authority has received $3.3 billion in federal funds. **Exhibit 3.3** provides an update of how those funds are proposed to be used and what components of the Merced to Bakersfield segment remain unfunded (green indicates funding).

Exhibit 3.3: Merced to Bakersfield Phasing Approach for Federal Grants (2024 Business Plan)


Environmentally Cleared/STB Approved
Advanced Design to 30%
ROW & other Early Work
Final Design to 100%
Civil Construction*
Track & Systems (1st Track)
Track & Systems (2nd Track)
Trainsets (for testing & operations)
MERCED
MADERA
FRESNO
KINGS/ TULARE
POPLAR AVENUE
BAKERSFIELD
171-Mile Segment Environmentally Cleared***
119-Mile Segment Under Construction***
Completed
Funded and Underway, including 2023 IIJA Grant Awards for portions of A, C, D-1
PHASE A (2024): Future Federal IIJA Grants for second track on 119-Mile segment
PHASE B (2024): Future Federal IIJA Grants for Civil Construction from Madera to Merced (MLK Way)
PHASE C (2025): Future Federal IIJA Grants for Civil Construction from Merced (MLK Way) to Merced Station (R Street), from Poplar Ave. to North Bakersfield, Track & Systems from Madera to Merced Station (R Street)
PHASE D-1 (2026): 2023 Federal IIJA Grants for Track & Systems from Poplar Ave. to North Bakersfield
PHASE D-2 (2026): Future State and Federal Funds not currently identified from North Bakersfield to Bakersfield Station (F Street)
*Full Stations Build-out will be separately procured from Civil Works Construction.
**2022 RAISE Award
***ARRA, FY 10, 2021 RAISE Grants
****2023 CRISI Grant Award (6 Grade Separations in Shafter)

Future Funding

Currently identified funding of approximately $28.8 billion is not sufficient to fully fund the program through completion of the Merced to Bakersfield passenger service, which is estimated in Chapter 5 to cost between $32.1 billion and $35.3 billion (Table 5.0.1). The Authority is endeavoring to close most of that funding gap with new federal grants as outlined in this section. Due to success with grant awards through 2023, the Authority is confident of additional grant awards going forward. At the same time, this section calls out the need to stabilize state funding and discusses several approaches. The Authority recommends the Legislature address the stabilization of state funding in the 2025-26 session, as that action should not wait until the expiration of the Cap-and-Trade Program at the end of 2030.

Federal Funds

As previously stated, the federal government is an essential partner in delivering the vision of high-speed rail nationally and in California.

The Authority has identified a total of nine Bipartisan Infrastructure Law (BIL) programs to target its grant applications. **Table 3.2** shows the nine BIL programs with funding appropriated and authorized. The last three on the list are newly added target programs since the 2023 PUR.

The Authority set a target of $8 billion in new federal grants from BIL programs and was awarded $3.3 billion this year. The Authority will continue to pursue this aggressive goal and seek another $4.7 billion from the Federal-State Partnership National Program in future grant cycles and from other BIL programs. Anything not achieved through BIL will be pursued through other ongoing federal funding.

For high-speed rail to be developed to match the level that exists in most other economically advanced countries, a permanent and stable federal funding commitment is necessary. President Eisenhower's National Interstate Defense Highway Act of 1956 set the stage and created that commitment for roadways. A "National Defense Act for Global Warming" could include high-speed rail as a top priority — and the Authority will continue to work with federal partners to advocate for a high-speed rail funding program more on par with what currently exists for highway and local transit funding.

Table 3.2: Bipartisan Infrastructure Law Grant Programs ($ in Billions)

Competitive Grants Program	Eligibility/Purpose	Appropriated	Additional Authorization[1]	Total[1]
Federal-State Partnership for Intercity Passenger Rail Grants (Fed-State) (excluding the Northeast Corridor set-aside)	High-speed rail and all intercity rail expansion projects Multiyear commitments possible	$12.0	$4.1	$16.1
Consolidated Rail Infrastructure and Safety Improvements (CRISI)	Capital projects that will improve passenger and freight rail transportation systems in terms of safety, efficiency, or reliability	$5.0	$5.0	$10.0
National Infrastructure Project Assistance Program (NIPA) (Megaprojects)	Broad eligibility for different types of infrastructure	$5.0	$10.0	$15.0
Local and Regional Project Assistance Program (L&R) (RAISE Grants)	Invest in roads, rail, transit, and port projects to achieve national objectives	$7.5	$7.5	$15.0
Nationally Significant Multimodal Freight and Highway Projects (INFRA Grants)	Fund highway and freight projects of national and regional significance Available for rail/highway crossing projects	$3.2	$6.0 (Authorization) and $4.8 (Contract Authority)	$14.0
Federal Railroad Administration Railroad Crossing Elimination Program	Highway-rail grade crossing improvement projects that focus on improving the safety and mobility of people and goods	$3.0	$2.5	$5.5
Reconnecting Communities and Neighborhoods (RCN)	The RCN program invests to reconnect communities that have been disadvantaged by transportation infrastructure	$1.0	NA	$1.0
Grid Resilience and Innovation Program (GRIP)	Supports innovation for electric power transmission and distribution capacity and resiliency, including for providing renewable power to disadvantaged communities	$10.5	NA	$10.5
Wildlife Crossings Program	Goals of reducing wildlife vehicle collisions and improving wildlife connectivity for both terrestrial and aquatic species	NA	$0.4	$0.4

Key to Terms:
Appropriated - Funds are appropriated in the legislation. Authorized funds can only be released upon future appropriation by Congress.
Contract Authority - Funds come from the Highway Trust Fund and do not require appropriations to be released.
Notes: 1 Final FY22 and FY23 federal appropriations fell below the additional authorized amounts in the BIL.

Target Dates for Future Funding

The Inspector General has recommended that the Authority include in the Final 2024 Business Plan a range of dates for securing funds to complete unfunded elements of the Merced to Bakersfield segment. The optimal date to complete funding for the Merced to Bakersfield segment is "now."

Table 3.3 shows the end date of the range, which is when the funding is deemed critical to stay within the 2030 to 2033 schedule window. Also listed on the table are the federal funding programs assessed as the best fit for each scope element; however, this is not limiting for future applications. The Authority notes the support of the federal administration is critical to continue to achieve the robust level of grant awards we received in 2023, and the relationship with the current administration is strong.

A later section of this chapter discusses the confidence level for federal, state, and local funding. For federal funding, confidence is expressed in aggregate across all grant programs rather than at the level of individual grant applications or programs, because the Authority intends to compete vigorously in all programs for which it is eligible.

Table 3.3: Target Dates to Secure Funding for Major Unfunded Elements of Merced to Bakersfield

Scope[1]	Total Scope Cost ($ in billions)	Federal Grant Award Opportunity ($ in billions)[2]	State Match Portion[2]	Last Date to Secure Funding to Maintain Schedule Window (Critical)	Best-Fit Federal Grant Programs
Merced Extension Civil Construction	$ 3.71	$ 2.93	$ 0.78	Q1 2026	FSP, CRISI, RCE, RCN, WCP
Bakersfield Extension Remaining Civil Construction	$1.38	$ 1.10	$ 0.28	Q2 2026	FSP, CRISI, WCP
Second-Track on 119-Mile Section	$1.42	$ 1.12	$ 0.30	Q1 2026	FSP, CRISI, MEGA
Kings/Tulare Station Construction	$ 0.25	$ 0.20	$ 0.05	Q3 2027	RAISE, MEGA
Merced Station Construction	$ 0.33	$ 0.26	$ 0.07	Q3 2027	RAISE, MEGA
Bakersfield Station Construction	$ 0.37	$ 0.29	$ 0.08	Q3 2027	RAISE, MEGA
Merced Extension Track and Systems	$ 1.14	$ 0.90	$ 0.24	Q1 2029	FSP, CRISI, MEGA, INFRA, GRIP
Bakersfield Extension Remaining Track and Systems	$ 0.19	$ 0.15	$ 0.04	Q4 2029	FSP, CRISI, MEGA, INFRA, GRIP
Totals	**$ 8.79**	**$ 6.95**	**$ 1.82**		

Note: 1. Some individual scope elements will have multiple contracts and some contracts may include multiple notices-to-proceed.
2. Costs reflect assumed federal share based on recent grant awards which have averaged 79% federal and 21% state.

Legend
FSP: Federal-State Partnership for Intercity Passanger Rail, **CRISI:** Consolidated Rail Infrastructure and Safety Improvements, **MEGA:** National Infrastructure Project Assistance Program a.k.a Mega-Projects, **RAISE:** Rebuilding American Infrastructure with Sustainability and Equity, **INFRA:** Nationally Significant Multi-modal Freight and Highway Projects, **RCE:** Railroad Crossing Elimination, **RCN:** Reconnecting Communities and Neighborhoods, **GRIP:** Grid Resilience and Innovation Program, **WCP:** Wildlife Crossing Program.

State Funds

The Authority currently has two major state funding sources: (1) Proposition 1A, a fixed amount of $9.0 billion; and (2) annual Cap-and-Trade funding, which currently has a statutory sunset date in 2030. The Authority, therefore, needs to stabilize funding for continued work beyond that time. Actions to stabilize the program funding in the shorter term would benefit the project and the state.

New revenue and financing options would have the following goals:

- Establish a permanent state funding source for the Authority, recognizing the one-time or limited-time nature of Proposition 1A and Cap-and-Trade funds.
- Diversify the stream of state revenue for the project in a way that reduces the significant revenue fluctuations that are part of the Cap-and-Trade program and the Proposition 1A bond program.
- Establish a permanent and reliable revenue stream the Authority could use to leverage low-cost federal financing programs such as the Railroad Rehabilitation and Improvement Financing (RRIF) and Transportation Infrastructure Finance and Innovation Act (TIFIA).
- Grow revenue in a way that reinforces the state commitment and leadership for high-speed rail as the Authority works to also create permanent federal funding for high-speed rail. This joint state and federal commitment are necessary to achieve operational high-speed rail in California.

To achieve these goals, the following revenue and financing options could be considered, among other options:

- Extend Cap-and-Trade to 2050 and diversify funding. Continue the Cap-and-Trade Program through 2050 and consider an exchange of a portion of the Authority's funding with other state funding to reduce revenue fluctuations affecting the Authority's program. This action would establish an ongoing funding stream likely exceeding $1.0 billion per year and diversify and stabilize funding with a more stable revenue baseline. If established with appropriate provisions to enable securitization, the diversified funding for the Authority could allow for financing through federal programs such as RRIF and TIFIA. Financing programs would allow future revenue to fund near-term capital investments. Such financing has been discussed in prior business plans. As an illustration of securitization, a $1.0 billion annual Cap-and-Trade revenue stream over 20 years with 1.50 debt service coverage would advance $6.4 billion to $8.0 billion for near-term expenditures, with the range based on interest rates between 4 and 6 percent.
- Make high speed rail a priority for "Rainy Day" Infrastructure Funds. Proposition 2 Budget Stabilization Account (Rainy Day Fund) of the State Constitution requires that certain funds be directed to infrastructure investments when the Rainy Day Fund is at the constitutional maximum of 10 percent of General Fund revenues. When this mechanism is triggered, directing these funds to the Authority would advance additional segments to construction. Beyond constitutionally mandated Rainy Day Fund, other General Funds were directed to Transportation Infrastructure in 2022 and 2023 Budget Acts — but none of these funds went to high-speed rail. When the state budget again returns to years of budget surpluses, the high-speed rail project is an appropriate use of surplus state funds that would not create new ongoing funding commitments of General Fund dollars.

- Prioritize transportation funding dedicated for rail improvements for joint benefit projects or investments that benefit regional or local operators and advance the state's priority to get high-speed rail operational as soon as possible.

Local and Regional Funding

Funding opportunities multiply in shared corridors where passenger rail service is provided by regional rail operators today and the corridors will be shared with high-speed service in the future. In these cases, multiple opportunities exist for local and regional funding to match a broader suite of state and federal grant programs. Some of the projects implemented to date have leveraged the Authority's bookend funds, and others have leveraged federal funds or other state funds without an Authority contribution but based in part on future high-speed rail benefits.

Senate Bill 198 (SB 198) of 2022 limits capital expenditures outside the Central Valley to (1) commitments that existed at that time, (2) project-wide capital expenditures, and (3) new commitments with Cap-and-Trade funds not to exceed $500 million with specified review by the Office of the Inspector General and notification to the Legislature. As specified, the Authority has not entered into any new commitments — the bookend projects listed were existing commitments prior to SB 198, and the Authority has not committed any funding to the shared corridor projects listed on the next page.

Bookend Projects

- Caltrain electrification: $714 million from the Authority was leveraged with $1.7 billion in local, federal, and other State funds for this $2.4 billion project. This project is expected to be completed by the end of 2024.
- San Mateo grade separation: $84 million from the Authority was leveraged with $122 million in local, federal, and other State funds for this $206 million project. This project is completed.
- Rosecrans/Marquardt grade separation: $77 million from the Authority was leveraged with $80 million in private, local, federal, and other State funds for this $156 million project. This project is expected to be completed by the end of 2025.
- Los Angeles Union Station (LinkUS): $423 million from the Authority will leverage more than $527 million local, federal, and other state funds. This project is currently under review for cost and schedule.

"Caltrain's future is here. Electrification will transform Caltrain into a faster, more efficient, more equitable and sustainable service between San Francisco and San José. California High-Speed Rail is the railroad's partner on electrification and the future blended system on the Peninsula. Through close coordination and continued investment in the Caltrain corridor, we will develop one of the most traveled, most advanced rail lines in the country."

— Michelle Bouchard,
Caltrain Executive Director

Other Shared Corridor Projects

- Los Angeles County Metropolitan Transportation Authority (LA Metro) Doran Street grade separation: $38.3 million grant to support construction activities to eliminate the at-grade crossing at Doran Street and the construction of a grade-separated structure that links Los Angeles and Glendale.
- Chester Avenue connectivity and climate adaptation project in the City of Bakersfield: $10 million in RAISE grant funding to create a multimodal transportation corridor for much-needed connectivity between the Downtown Bakersfield High Speed Rail Station and surrounding underserved neighborhoods and businesses.
- City of Palo Alto grade separations at Churchill Avenue, Meadow Drive and Charleston Road: $30 million in grant funding to help develop alternatives to separate the roadways from train tracks and additional funding for the final design phase for the Churchill Avenue grade separation.
- San Joaquin Regional Rail Commission: $40 million grant award in Trade Corridor Enhancement Program funds to double-track the Union Pacific Railroad line between Turlock and Ceres.
- San José: $7.5 million in grant funding to conduct preliminary engineering and environmental reviews necessary for grade separations at three at-grade crossings of Union Pacific Railroad tracks in San José.
- Corridor ID projects in the High Desert Intercity High-Speed Rail Corridor, the Capitol Corridor, and the San Joaquin Valley Corridor: $1.5 million in grant funding to develop scope, schedule, and cost estimates for preparing, completing and/or documenting service development plans.

Level of Confidence for Anticipated Funding

Prior sections of this chapter detailed existing and anticipated federal, state, and local funding. This section discusses the level of confidence the Authority projects for each type of funding. The level of confidence below is associated with the funding sources outlined in **Exhibit 3.0.**

- Proposition 1A – this funding source has been appropriated by the Legislature, and the Authority has not experienced any difficulty selling bonds since litigation was resolved about a decade ago. The level of confidence for this funding is high.
- Cap-and-Trade – this funding source has provided revenue over the past decade in excess of the Authority's revenue projections. The market has experienced a few shocks, with the most recent being COVID-19, which resulted in revenue falling below projections in 2020. Despite occasional market disruption, the unsold allowances have been sold in subsequent auctions, resulting in the impact of market shocks being only temporary. The level of confidence for this funding is medium-high through the 2030 statutory authorization of the program.
- Federal Grants – federal grants have historically been very reliable once awarded; however, the Authority notes that the Trump Administration did seek to terminate a federal grant awarded during the Obama Administration. The Authority ultimately retained that grant through litigation and a settlement with the Biden Administration. Given that history, the level of confidence for awarded federal grants is affected by which administration will govern beyond 2024. For future federal grant awards, the amount of funding available from Congress

and the support of the executive branch will likely fluctuate based on election results. Since 2021, the Authority has been awarded six grants — three RAISE grants, a CRISI grant, a FSP-National grant, and a Corridor ID grant — for a total of $3.3 billion. Our confidence level for continued federal funding remains high should the Biden-Harris Administration continue beyond 2024.

- Local Funding – Certain local and regional funds support the Bookend Projects described in this chapter. To date, these local funds have proven reliable, although some of the local revenue sources can be affected by the condition of the economy. The level of confidence for this funding is medium-high.

Private Sector Financing

Proposition 1A, which was passed in 2008, directed the Authority to "pursue and obtain other private and public funds" to supplement the $9 billion in bond funds approved for the California high-speed rail system.

While no private funding is currently being utilized, it remains our objective to secure private investment in the program. We have long believed private-sector partners would be more willing to invest in the construction and operation of the system once the risks, returns, and systems operations are better understood and more advanced.

As we near the completion of environmental clearance work for the Los Angeles to San Francisco system, the Authority is now in a position to engage potential private partners. In 2024, the Authority plans to issue a Request for Expressions of Interest (RFEI) for private partnerships, providing an avenue for interested firms to express their desire to collaborate with us to deliver segments between San Francisco and Los Angeles. To ensure the RFEI aligns with our project's needs and objectives, the Authority plans to collaborate closely with the state Legislature to draft the request.

Monetizing the Silicon Valley to Central Valley Line

A fundamental goal of the program is to create a commercially successful and financially sustainable high-speed rail system. Once the Silicon Valley to Central Valley Line is built and in operation, it will become a viable commercial enterprise, generating revenue and producing positive cash flow. Upon demonstrating a level of operational maturity, this positive cash flow can be monetized through financing and private investment, which can then help fund future development of the system. As demonstrated in other high-speed rail markets, including California/Nevada's Brightline West project, private-sector operators are expected to invest a considerable amount to own the rights, through a concession, to the long-term operations of a commercially viable high-speed railway.

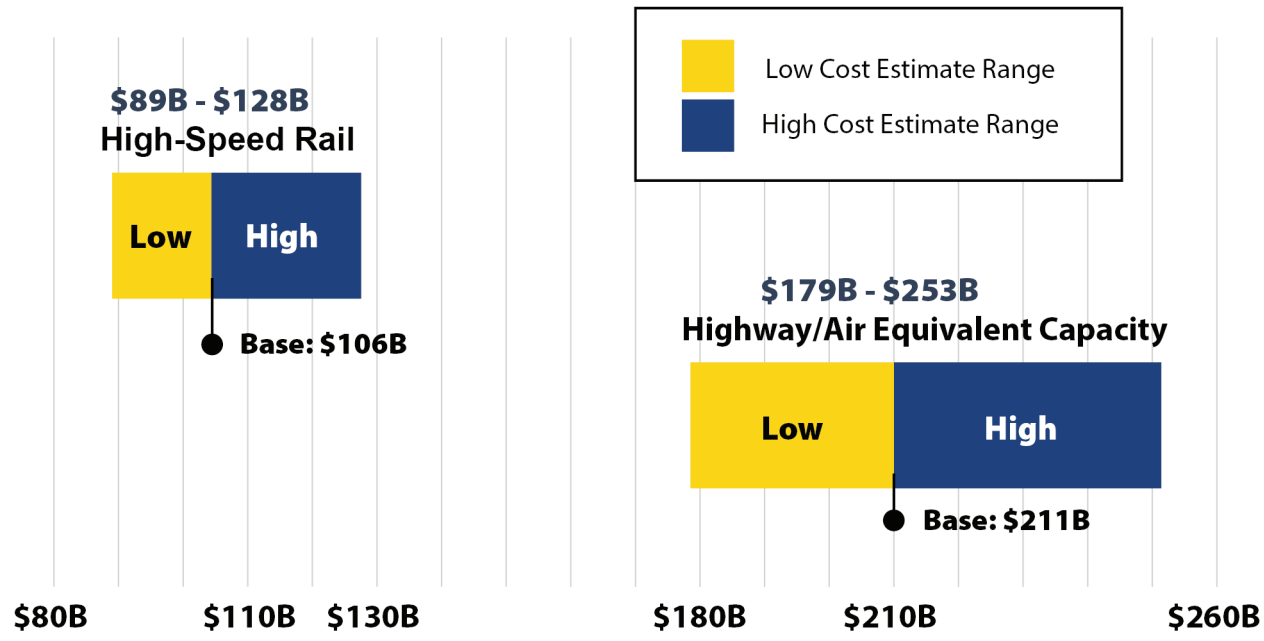
High-Speed Rail Affordability

High-speed rail is the most cost-effective and policy-effective mode of transportation to address intercity transportation needs. The Authority has included in past reports a comparison of the cost of Phase I High-Speed Rail relative to the cost of achieving equivalent capacity through highway and airport expansions. For this year's report, the cost of highway and airport capacity was updated using inflation factors from California specific cost indices (***Caltrans Highway Construction Cost Index*** and ***Department of General Services California Construction Cost Index***) to escalate capacity calculations in the preceding 2019 Equivalent Capacity Report.

As shown in **Exhibit 3.4**, high-speed rail is the best value investment with a cost range of $89 billion to $128 billion compared to the cost range of $179 billion to $253 billion that would be necessary to construct the equivalent highway and air passenger capacity. For more information on the original report, see the ***2019 Equivalent Capacity Analysis Report***.

Despite the record investment in rail made possible by the IIJA, the primary challenge for delivering rail projects and specifically high-speed rail projects in the United States remains funding. Although there are long-term and stable funding streams for highways, airports, and local transit, that is not the case for high-speed rail. As an example, the federal fiscal year 2024 apportionment for highways was about $54 billion, and that does not include funding that states provide. Establishment of long-term and stable federal and state funding at even a fraction of the level at which highways are funded would spur high-speed rail construction across the nation.

Exhibit 3.4: Estimated Capital Cost Ranges of High-Speed Rail Phase I System and Equivalent Highway and Airport Capacity (YOE $ in Billions)



Cost Risks

The Authority is continuing to advance the project to meet the budget goals in the 2023 PUR. Risks for construction costs are discussed in Chapter 5, with the greatest cost risk for CP 2-3. The recently awarded $3.1 billion Fed-State grant marks a significant budget contribution, allowing the project to maintain its current trajectory for work in the Central Valley. Although this funding is a crucial step and we recognize the importance of careful stewardship of these funds, we will need additional resources to realize the initial operations of high-speed rail service.

"I am proud to champion this historic federal investment for California High-Speed Rail. California has never been afraid to take on big and bold challenges — including the development of the nation's first true high-speed rail network. Thanks to the Bipartisan Infrastructure Law and President Biden's leadership, California has a partner in this effort to power our economy, reduce emissions, and connect our communities through high-speed rail."

— Alex Padilla, U.S. Senator

Photo: Idaho Avenue Overcrossing

Photo: Land survey work in the Central Valley

CHAPTER 4: ACCOUNTABILITY THROUGH RISK MANAGEMENT

Introduction

The Authority has established a robust and effective Enterprise Risk Management program in support of its mission, vision, and key goals. The program enables the Authority to operate in a transparent manner while maintaining accountability to stakeholders and the public.

Enterprise Risk Management Mission

Our mission is to foster a risk-aware culture to focus decisions on the proactive management of risks to support the Authority in achieving its statewide goals and objectives.

Enterprise Risk Management Vision

Our vision is an organization where every decision is informed and guided by a sound understanding of risks as they relate to achieving the Authority's goals and objectives.

As with any megaproject or large-scale capital program such as California's high-speed rail project, risk is inherent in the work, and the Authority faces a variety of internal and external risks, which have the potential to affect the success of our stated goals and objectives. Actively managing those risks is critical to objectively frame and guide decision making at all levels of the organization and to achieve the program's strategic objectives.

The Authority continues to work toward enhancing and expanding the scope of risk management, integrating across all levels of the organization, and supporting the mitigation of key risks from specific projects up to the enterprise level. By establishing a process of continuous improvement, identifying what has worked well and what could be improved upon, the Authority's risk management function serves to reduce risk impacts and maximize opportunities.

Control Environment

The Authority is committed to delivering high-speed rail in California and achieving its mission in a way that demonstrates the highest standard of ethical values and integrity. In pursuit of its mission and goals, the Authority's decision making is guided by a control environment through the following principles:

Transparency and engagement: Engage and consider input from the public and the Authority's stakeholders in an authentic, two-way dialogue to provide information about program achievements, milestones, and challenges.

Stewardship: Protect and conserve public and environmental resources dedicated to this project.

Performance: Apply specific performance measures to track progress and support the development of a robust culture of program delivery and accountability.

Diversity: Develop and support a fully capable and diverse workforce.

Safety: Prioritize the safety and security of the Authority's workers, employees, and customers.

Sustainability: Deliver a system that maximizes benefits to priority communities, protects resources, and serves in the transition to a low-carbon economy.

To further guide the Authority in building and maintaining an effective control environment, the Authority has a standard code of conduct policy that holds our leadership and staff accountable for establishing an ethical course of action and decision making by developing and adhering to internal controls and procedures.

Risk Governance

The standard-setting bodies, such as the Committee of Sponsoring Organizations of the Treadway Commission and the International Organization for Standardization, provide several definitions of Enterprise Risk Management. Enterprise Risk Management can be defined as the culture, capabilities, and practices that organizations apply in setting and carrying out their enterprise strategy with the purpose of actively managing risk to realize and preserve value.

It is important to note Enterprise Risk Management is not simply an inventory of risks and is broader than the Authority's system of internal controls. The principles apply at all levels of the organization and across functions. It is intended to be fully integrated into the Authority's structure and system of governance to enable risk-based decisions and provide reasonable assurance to all stakeholders regarding the achievement of the enterprise objectives.

Within the Authority, decisions are made through a hierarchy of governance, which includes:

- Applying relevant statutes and regulations
- Defining organizational structure as well as clear roles and responsibilities
- Knowing and understanding individuals' corresponding duties and authorities
- Incorporating complementary internal processes and policies
- Employing comprehensive program leadership to support project management

This effective governance structure achieves:

- The Authority's goals in pursuit of its mission
- Stewardship of public resources to create added value, and reduced costs and associated risks
- Organizational and functional excellence
- Accountability by empowering individual and organizational entities
- Broad-based internal and external stakeholder engagement and communication

Within the administrative jurisdiction of the California State Transportation Agency, the Authority operates with some policy and programmatic independence. The Authority's control environment is governed at the highest level by a Board of Directors comprised of nine voting members and two non-voting ex-officio members. The Board oversees the planning, construction, and operation of the project.

The Chief Executive Officer (CEO) ensures that the Authority conducts itself in accordance with applicable federal and state laws, regulations, and the policies of the Board. The CEO also ensures the Authority complies with applicable grants. The CEO is accountable for all Authority activities and is responsible for communicating with the Board, organizing and providing direction to the Authority to accomplish its mission, and delegating authority, as needed, to accomplish the Authority's mission.

Authority Committee Structure

The Authority maintains a structure of seven governance committees: the Executive Committee (EC), Program Delivery Committee (PDC), Business Oversight Committee (BOC), Administrative Committee (AC), Change Control Committee (CCC), Project Delivery Advisory Committee (PDAC), and Enterprise Risk Committee (ERC). Each committee has its own purpose, organization, roles, and responsibilities as specified in each respective committee charter. These committees ensure a strong governance structure with a streamlined system for decision making and problem resolution.

The PDC, BOC, CCC, and AC report directly to the Executive Committee, while the ERC reports directly to the Finance and Audit Committee (a subgroup of the Board of Directors). The Authority regularly reviews its committee structure and implements changes as necessary to ensure appropriate governance in line with current operations.

Executive Committee

The Executive Committee is the senior governance committee. Members of the committee advise the CEO, who chairs the committee, on key agency decisions and recommendations to the Board. The Executive Committee makes executive, enterprise-wide policy decisions, provides overarching Authority strategy and priorities, resolves escalated disputes, and reviews agenda items for upcoming Board meetings.

Administrative Committee

The Administrative Committee provides guidance on human resources, information technology, communications, employee engagement, administrative functions, and facilities outside Program Delivery. The AC ensures effective and prudent administration and support to the entire Authority.

Development Review Committee

The DRC and its members ensure that land owned by the Authority, including land within station site and area boundaries, is developed in a manner that prioritizes revenue-generating opportunities for the Authority and carries out the goals set forth in the Station Site Development Policy and Land Management Policy. The DRC oversees the Development Proposal review process and acts as a conduit for informing and assuring Authority executive management of any commercial development opportunities and issues affecting the high-speed rail system.

Business Oversight Committee

The BOC provides programmatic acquisition strategy, procurement governance, and commercial oversight. It acts as the program baseline configuration-management control board and approves all changes of scope, timeline, and budget to any program element within the program baseline. This committee ensures program baseline compliance with federal and state regulations and statutes and approves any program execution or fiscal request prior to presentation to the Board. The BOC escalates issues to the Executive Committee for resolution as needed.

Program Delivery Committee

The PDC provides governance and oversight of the Authority's programmatic execution and performance. The PDC is accountable for all aspects of program development and delivery in accordance with the program baseline, including scope, schedule, and adherence to budget. This committee surveils the program opportunities and risk impact to the program baseline, and advises the Board, the CEO, and the Executive Committee regarding program execution and performance.

Program Delivery Advisory Committee

The objective of this committee is to define, evaluate, advise, and ultimately recommend a project delivery method applicable for completion (design and construction) to maintain the timely and efficient delivery of the high-speed rail system. It also provides technical advisory of risks, costs, schedule, scope, real property requirements, utility relocation issues, funding strategies, grant requirements (if applicable), and other requirements related to the section as well as its interfacing points with the program.

Change Control Committee

The Change Control Committee is responsible for overseeing and improving the Authority's processing, decision making, and documentation of construction package change orders (COs). The committee helps ensure the consistency and timely evaluation of COs that are equal to or greater than $1 million in total value. The CCC will validate merit (based upon contract provisions, risks assessments, cost estimates, and schedule analysis), set Finding of Fact (FOF) and CO documentation standards, review FOFs and COs equal to or greater than $1 million for sufficiency and clarity, and make recommendations on approval/disapproval of COs.

Enterprise Risk Committee

The ERC is responsible for the overall oversight of the Enterprise Risk Management (ERM) program, prioritization of risks, review of sufficiency for risk responses, and reporting of prioritized enterprise risks to the Board. The ERC evaluates risks of the Authority and decides which are the highest threats and opportunities to be addressed and provides guidance on taking action to mitigate those risks or take advantage of opportunities. In addition, the ERC reviews management risk responses and determines the sufficiency, adequacy, and completeness of those responses.

Supporting the Control System

The Authority defines roles and responsibilities for delivering objectives and implementing controls for the organization that are found in the Program Management Plan, Organizational Management Plan, responsibility matrices, and duty statements for all Authority staff.

The functional organization chart and Concept of Operations also describes the Authority's organization and illustrates the interface points for each organizational entity. Each governance committee also has charters in place to define the scope of its oversight in the Authority's control environment and to document outcomes, which are stored in our internal information storage systems.

To monitor overall performance and the adherence toward the Authority's mission and strategic objectives, executive-level management reports are provided each month to a Board of Directors subcommittee to communicate progress, risks, and opportunities to meet the high-speed rail project goals. The Authority also regularly coordinates with, and reports to, its state and federal partners as well as the public to build trust through transparency and early outreach.

To further evaluate and improve our control environment, the Authority has conducted an enterprise-level assessment of its existing system of internal controls, to align with the principles identified in the Government Accountability Office's Greenbook (i.e., Standards for Internal Control in the Federal Government). This effort, under supervision of the CEO, will be leveraged to further enhance the Authority's system of internal controls

Establishing and Maintaining a Competent Workforce

A critical aspect of our control environment is a competent workforce that ensures the efficient progress and continuous oversight of the high-speed rail program (including risk management). The Authority has established a Workforce and Succession Plan, which defines how we will evaluate and manage position vacancies, position increases, retirement risks, knowledge transfer, and bench strength.

The Workforce and Succession Plan is regularly updated to address the workforce needs as the high-speed rail program evolves. It provides the framework to address workforce gaps and business needs, which allows the Authority to strategically position the right people in the right roles at the right time to support continued successful delivery of the program. This plan builds upon the Authority's current workforce management practices and identifies initiatives to improve our ability to recruit, hire, compensate, develop, engage, and retain exceptional talent.

Information and Communication

The Authority's management, oversight, and reporting of information within its internal control structure is carried out by management and staff and is supported by its Office of Strategic Communications. Following internal guidance and external mandates, Authority offices work together to systemically collect, validate, and disseminate timely and accurate information to its internal governance committees as well as to external partners in alignment with state and federal law (i.e., media relations, publications, and external affairs).

The main responsibility is to proactively collect and communicate relevant, reliable information — both externally and internally — to inform decisions and enhance program efficiency. The Office of Strategic Communications also works closely with regional staff and the small business team to support the program by developing informational materials and conducting outreach at community meetings, working groups, and public events.

To further assist our objective for aggregating and reporting accurate information (internally and externally), management and staff work closely with the Office of Information Technology to design and implement technology or other digital enablers to collect, validate, assess, and share information. Technology continues to play a critical role in the Authority's control environment, including enhancing our ability to monitor performance to achieve our enterprise-wide objectives.

Monitoring Risk Throughout the Program

The information included here discusses the entity-wide, continuous process to ensure internal control systems are working as intended. The Authority has an executive monitoring sponsor dedicated to facilitating and verifying that monitoring practices are implemented and functioning. In addition, the Authority has established a robust three-lines-of-defense model to support its control environment. This model monitors the sufficiency and adequacy of existing controls in the Authority's daily operations and organizational structure. It encompasses the identification, reporting, and monitoring of top risks, inefficiencies, and mitigation plans.

The model includes working with the first line of defense: management staff who design and implement their current controls and provide ideas for future controls and response planning activities. These critical actions are overseen and supported with tools, templates, workshops, and training from the Authority's second line of defense: the Risk Management Office's (RMO) Quality teams, which evaluate whether the controls are driving the intended performance outcomes.

Finally, the internal audit function provides the third line of defense through performing audits in select areas to determine if processes and procedures are documented, followed, and supported. These audits ensure staff from the first and second lines of defense are adhering to established internal controls and those controls are achieving their intended objectives. The Authority's third line of defense was recently bolstered with a newly appointed Inspector General.

In addition to the dedicated role to project controls and three-lines-of-defense model outlined above, each functional group within the Authority owns its respective portfolio of administrative and capital risks and is responsible for the implementation of the necessary controls and risk responses.

Documented chains of reporting provide structure for management and staff to report and escalate risks and deficiencies in internal controls to their respective office chief on the Enterprise Risk Committee. Each office and active project also reports its portfolio of risks and controls during the Authority's annual enterprise risk assessment process. In addition to enterprise-level monitoring, top project risks and controls are continuously monitored and reported each month by Authority staff and contractors to executive teams in confidence meetings for evaluation and coordination to mitigate (i.e., enhance project controls) potential risk impacts to the program baseline.

While management is chiefly responsible for developing and monitoring internal controls, the RMO, Internal Audit Office, and OIG also play key roles in independently evaluating the effectiveness of internal controls.

Quality Management System (QMS)

The Authority has developed a quality program and utilizes a Quality Management System (QMS) following International Organization for Standardization (ISO) to ensure requirements and expectations are met in a manner that supports the continuous improvement of Authority processes. The QMS is overseen by the Quality Management Team (QMT), which closely coordinates with various groups within the Authority to achieve a functional, certified, and commercially viable high-speed rail system.

The QMS defines the process for identifying, documenting, and tracking quality and compliance-related issues, including Non-Conformance Reports (NCRs). The QMT assigns ownership of the NCRs and monitors the status of each non-conformance through resolution in a centralized tracking system. Critical issues are escalated through the Authority's governance system.

Once a non-conformance is resolved, the QMT team will close the NCR and monitor the relevant area for future non-conformances through annual audits. The QMS monitors the effectiveness of the risk management and internal control systems, including how management responds to vulnerabilities.

In addition, the QMT utilizes periodic meetings and several governance committee forums to report inefficiencies and ensure timely reporting and communication of potential issues to relevant executives and staff.

The Risk Management Office (RMO)

The Risk Management Office (RMO) is responsible for implementing an Enterprise Risk Management (ERM) program that provides guidance and advice on risk management to offices and projects across the organization and works collaboratively with all areas of the organization to ensure risks are being appropriately identified, tracked, responded to, and monitored at every level (i.e., at the Enterprise, program, and project level).

The mission of the ERM program is to foster a risk-aware culture to focus decisions on the proactive management of risks to support the Authority in achieving its statewide goals and objectives. The vision is an organization where every decision is informed and guided by a sound understanding of risks as they relate to achieving the Authority's goals and objectives.

Enterprise Risk Assessment Process

The Authority's ERM mission and vision are carried out, managed, and staffed through a seven-step process overseen by the Enterprise Risk Committee. See **Exhibit 4.0** for a breakdown of these steps.

The process shown above is supported by an ERC-approved methodology, risk rating criteria, and taxonomy, which facilitates the categorization, assessment, and prioritization of risks in the enterprise risk assessment (ERA) process.

On an annual basis, the RMO conducts an ERA that solicits the top risks and related controls from each office and active project (both administrative and capital risks to Authority objectives), with the ultimate goal of refreshing our enterprise risk register and initiating mitigation activities that address inefficiencies and manage potential impacts. Using the tools, templates, and methodologies outlined above, the RMO conducts a formal prioritization of risk submissions to eventually report evolving or emerging risk trends.

The current enterprise risk register, managed by the ERC, is listed in **Table 4.0**

Risks managed at the Authority include upside risks (opportunities), which can enhance program objectives, and downside risks (threats), which could result in negative impacts to program objectives.

Risk workshops are conducted with the ERC, executive risk owners, and subject matter experts to define the top risks to the Authority for ERC monitoring and developing risk response plans. Risk reports are then shared with various governance committees and included in the Authority's strategic planning.

The following personnel are involved in the Authority's risk assessment process:

- Executive management, middle management, front-line management, and staff

The following methods are used to identify risks:

- Risk workshops, employee engagement surveys, ongoing monitoring activities, audit and review results, prior risk assessments, external stakeholders, questionnaires, consideration of potential fraud, performance metrics, and other methods

The following criteria are used to prioritize risks:

- Likelihood of risk occurrence, potential risk impact to mission/goals/objectives, timing of potential risk events, potential impact of remediation (mitigation) efforts, and priorities set by the Board, CEO, or Authority oversight agencies

Exhibit 4.0: Enterprise Risk Management Process Steps

Table 4.0: Authority's Enterprise Risk Register and Risk Type

Risk Title	Risk Type
Funding Uncertainty	Opportunity
Schedule Monitoring and Management	Threat
Stakeholder Engagement	Opportunity
Third-Party Management	Threat
Workforce Planning	Threat
Program Integration Management	Threat
Infrastructure and Asset Maintenance	Threat
Procurement Planning	Threat
Quality Control and Assurance (Construction)	Threat
Macroeconomic Impacts	Threat
Legislative Impact and Policymaker Support	Opportunity
Track and Passenger Rail Rights	Threat
Litigation	Threat

Overview of Top Risk Priorities

The following risks constitute several of the Authority's top strategic risks and mitigation plans as determined by the CEO and Enterprise Risk Committee:

Funding Uncertainty

Seeking additional funding sources remains a strong opportunity to support the future of the project. If the Authority receives new funding, it can continue and expand construction, and reduce risks associated with insufficient cash including project slowdowns and potential employee layoffs. The following mitigations represent how the Authority is managing this upside risk.

These controls have been established:

Proposition 1A and Cap-and-Trade Funding

- Submission of annual deliverables and reports to the Department of Finance and to the California Legislature to retain confidence of legislators.

Grants Funding Opportunities

- Submission of quality applications for new competitive federal funding opportunities.
- Implementation of a dynamic grant funding strategy that considers the best match for the Authority scope by federal program, both for large and small awards.

Forecasting and Managing Expenditures

- Active monitoring of projected expenditures and available cash to mitigate any potential short-term funding issues.

Schedule Monitoring and Management

While the project may experience unknown events, the Authority is committed to effectively manage, monitor, and report progress toward program schedule milestones to its internal and external stakeholders to inspire public trust and to detect and mitigate potential delays. The following mitigations represent how the Authority is managing this risk.

These controls have been established:

Basis of Schedule

- Basis of Schedule was established in alignment with the 2023 Project Update Report and will be updated (with assumptions and reasons for schedule changes) as program status and delivery strategy evolves.

Schedule Maintenance and Reporting

- Monthly coordination with project teams and functional directors to document schedule milestone completion dates, precursor/interdependent activities, etc. for monthly project reporting (e.g., Central Valley Status Report, Program Delivery Status Report).

Schedule Interface Management

- Monthly meetings and coordination activities with project teams to evaluate proposed schedule updates and proactively identify project interface risks that could prompt governance actions.

Documented Processes

- The Authority has established standard operating procedures, such as its program controls manual, to dictate schedule monitoring and maintenance processes that help ensure consistency in how we review, update, and approve project schedules.

These controls are in progress:

Schedule Governance

- The Authority's Business Oversight Committee (BOC) is designated powers to review and approve any changes to the Master Program Schedule. Schedule governance and change management procedures for project schedules will be rolled out across the program by Q3 2024.

Stakeholder Engagement

The Authority is committed to effectively coordinate and communicate internally and externally so it can proactively detect and manage events and issues that could impact stakeholder relations and support for the project (e.g., funding partners, local communities, public, etc.). The following mitigations represent how the Authority is managing this upside risk

These controls have been established:

Internal Coordination

- Collaboration and early awareness through ongoing internal executive staff meetings, led by the CEO, where executive and senior level managers can collaborate and discuss priority opportunities or issues.

Salesforce Events Management System

- Implemented a Salesforce Events Management System, which serves as single source of organization statewide for stakeholder events and information to inform the Authority's outreach plans and engagement. In conjunction with this, internal staff were educated and trained on this Salesforce system to ensure a seamless transition and a comprehensive understanding of the platform.
- Educated and trained internal staff on the Salesforce system to provide a single location for events information, stakeholder contact information, and notes from crisis incidents/ public affairs/stakeholder meetings.

External Communication Strategy

- Monthly scheduled meetings for consistent communication with key funding partners, legislators, and community members regarding updates, benefits, and progress of the project.

Regional Outreach Efforts

- The Authority has three regional offices (Northern, Central, Southern) within its organizational structure that host and attend stakeholder events to understand and address specific priorities and concerns in each region, and to highlight benefits of the high-speed rail program to impacted cities and counties.

Third-Party Management

The Authority works diligently to coordinate with third parties to identify and resolve risks, interfaces, dependencies, and changed conditions related to advancing the project. This helps to address the potential for additional scope/requirements that can delay the program schedule or adversely impact the program budget. The following mitigations represent how the Authority is managing this risk.

These controls have been established:

Third-Party Strikeforce and Accountability

- Weekly coordination meetings with functional directors to document, discuss, and resolve critical risks and issues impeding construction progress. Alongside, the third-party strike force team has developed an issue tracker to document and monitor the progress of resolving potential conflicts with third parties during construction.

- Regular meetings with staff and project construction managers to identify and mitigate potential adverse conditions that require third-party dialogue and agreements.

Weekly External Coordination Meetings to Address Third-Party Concerns

- External meetings conducted with key third parties to resolve third-party concerns to account for changing conditions for projects that are in advanced design or in active construction.

These controls are in progress:

Ongoing Engagement and Outreach

- The Authority holds regular meetings with third parties regarding segments in advanced design and construction phases to clarify construction and design plans and resolve conflicts (for both parties) and will continue to establish any necessary MOUs or other cooperative agreements as they become applicable.

Workforce Planning

The Authority will be unable to deliver the high-speed rail project if it cannot secure appropriate staffing to meet its demands and requirements. This can be achieved by successfully securing additional positions through the budget change proposal process, reclassifying existing positions, and/or efficiently managing staffing priorities to support the future demands and requirements of the project. The following mitigations represent how the Authority is managing this risk.

These controls have been established:

Enhancing Authority's Workload Planning and Staffing Through Ongoing Discussions and Streamlined Budget Change Proposals

- Conducted, and continues to carry out, Form to Function activities (assessments, reorganization, and budget change proposal [BCP] training) to streamline the adding of new state staff positions and replace consultant staff where appropriate.

Continued Execution of the RDP-PDS Transition Plan

- Developed, and continues to execute, a comprehensive contractor transition plan in short-, medium-, and long-term stages to ensure seamless transitions of functions, maintain project momentum, and extend existing support where necessary, preventing loss or disruption of expertise.

These controls are in progress:

Workforce Planning Strategies to Support Program Objectives

- The Authority is conducting organizational gap and risk assessments through surveying and program engagement to inform the development of workforce solutions and strategies that close critical gaps and mitigate workforce and succession risks. A revised workforce and succession plan is scheduled to be updated as a result by Q2 of 2025.

Program Integration Management

With the advancement of the project, including the prospect of additional funding, the Authority has initiated scopes of work for Merced and Bakersfield extensions, stations, and track and systems. The alignment of these various projects is crucial. If the Authority is unable to manage interfaces efficiently and effectively between moving the organization from the construction phase to the rail operations phase of the project, then schedule delays, increased costs, and other adverse impacts could result. The following mitigations represent how the Authority is managing this risk.

These controls have been established:

Program-Wide Governance and Oversight of Interface Risks and Issues

- Established program-level governance committees and working groups, which play a pivotal role in reviewing critical integration risks and issues, supporting effective management, and informing the integration strategy.

Defined Roles and Responsibilities in the Program Management Plan

- To avoid gaps or duplication in effort, the Authority has established a Program Management Plan (PMP), which segregates the authority, stewardship, and key responsibilities for each office, branch, section, and unit.

These controls are in progress:

Data Integration Strategy Meetings to Design and Prepare to Deliver an Integrated Rail System and Digital Strategy

- Digital strategy meetings led by the Authority's Rail Operations Branch are held weekly to establish a digital integration roadmap by Q2 2024, which will provide a foundation for key interface management activities.

Establish Clear Roles and Responsibilities for Managing Key Interfaces Across the Project

- To support integration, in Q2 of 2024 the Authority plans to publish its Organizational Management Plan, which defines key roles and responsibilities of each functional area, including key interfaces with other areas of the program to avoid gaps in integration management and inform decision-making across the organization.

Integration Strategy Support

- The Authority plans to initiate the onboarding of several track and systems contractors, beginning with a track and OCS designer in Q3 2024, to support the integration of all rail components across the alignment.

Litigation

A megaproject of this nature will experience various legal risks. These include potential litigation and adjudicatory administrative processes related to project funding, environmental clearances, property acquisition, and contract disputes. For example, when environmentally clearing the 119 miles in the Central Valley, the Authority faced close to a dozen California Environmental Quality Act (CEQA) lawsuits.

Today, despite having environmentally cleared three times the amount of the guideway (422 miles), the Authority has faced just four CEQA lawsuits. The Authority has seen significant success in litigation (see the Successful Mitigation of Previous Risk Priorities section) due to strategies and mitigations implemented by the Authority's legal team, improved third-party communication and coordination, and more definitive project advancement. Major litigation will consistently

be an area of risk for the Authority with potential impact to cost, environmental clearance, property acquisition, funding, public perception, and schedule of delivery; however, the Authority has instituted enhanced controls and resources to manage and mitigate the risk.

These controls have been established:

Tolling Agreements or Agreements to Stay Litigation

- Developed and put tolling agreements in place to avoid litigation.
- Executed litigation stays to provide opportunity for settlement negotiations and reduce litigation costs.

Records Management Policies, Procedures, Processes, and Retention Schedules

- Documentation published to all Authority staff regarding document retention, providing confidence to courts when litigation occurs that the Authority has properly maintained records.

Specialized Trainings to Project Teams, Clients, and Contractors

- In February 2024, our team initiated a training program on contract management and record retention for our staff to support future litigation. After a successful start, we're planning a second round of training in Q2 of 2024.

Successful Mitigation of Previous Risk Priorities

Since the 2023 PUR, the Authority has been successful in several areas deemed as risks in prior plans. These risks are related to right-of-way acquisition in the Central Valley, litigation risks, and third-party relocations:

Right-of-Way Progress Within the Current Construction Packages

As of December 2023, the Authority had met its goal for parcels delivered in the Central Valley to the design-builder, with 98 percent delivered.

- CP 4 right-of-way (ROW) is 100 percent complete for civil construction.
- The Authority's third-party strike force has resolved 66 out of 68 third-party issues (97 percent). Emerging issues are being monitored, managed, and reported.
- Revised schedule baselines have been established for all construction packages.

Successful Burbank Settlement

- On November 16, the Authority and the Burbank-Glendale-Pasadena Airport Authority reached an agreement that dismisses the Airport Authority's lawsuit regarding the high-speed rail project.
- The new agreement creates the framework for a collaborative process for the Authority to build a station with a direct connection to Hollywood Burbank Airport.
- The settlement commits the Authority and the Airport Authority to a collaborative process during advanced design, construction, and operation of the high-speed rail station adjacent to the airport to ensure compatibility with the replacement passenger terminal and other airport facilities.
- The agreement clears the way to advance from Burbank to Los Angeles Union Station, which positions us to move quickly in that section when funding becomes available.

Progress on Other CEQA Settlements

- The Authority has negotiated stays with three other parties with the intent to advance negotiations toward settlements.
- Quality of work on environmental documents has reduced litigation, and our strategy to timely settle CEQA litigation is allowing the project to advance.

Semitropic Water Storage District Agreement

- In November 2023, the Authority announced the completion of one of the last canal realignments in CP 4.
- The canal, owned by Semitropic Water Storage District, intersected with the Authority's alignment but has now been rerouted into a siphon that passes underneath.
- Earthen channel segments were constructed on the siphon's end to facilitate water flow back into the canal. The abandoned portions of the canal were backfilled with approximately 11,000 cubic yards of material to allow for the construction of the guideway.
- Semitropic Water Storage District recharged the canal in December 2023 and is in full operation.
- Restructuring of the third-party, ROW, and Legal teams contributed to this success.
- We continue to make progress on utility relocation and have lessons learned.

Summary

As the high-speed rail program expands and work is completed, some uncertainties and risks decline while emerging risks become more relevant. With the continued collaborative efforts across the Authority, facilitated by the RMO, the Authority is committed to continue inspiring trust through transparency as it detects, monitors, and manages potential threats and opportunities to our objectives.

Rendering: Merced Station interior

CHAPTER 5:
FORECASTS AND ESTIMATES

Introduction

The 2023 Project Update Report (PUR) provided major updates to capital costs, schedules, and project progression for each phase of the Authority's statewide work.

The forecasts and estimates prepared for this 2024 Business Plan were developed pursuant to statutory requirements and include:

- Capital cost estimates (shown in a range)
- Ridership and revenue forecasts (high, medium, and low)
- Operations and maintenance (O&M) cost estimates (high, medium, and low)
- Life cycle cost estimates (high, medium, and low)
- Cash flow estimates (high, medium, and low)
- A breakeven analysis (prepared with a Monte Carlo analysis to evaluate three scenarios)

To prepare its forecasts and estimates, the Authority must make assumptions regarding the phasing of the system. However, because full funding has not been identified, assumptions are used only for the purpose of preparing an estimate and are for illustrative purposes only (where applicable). Detailed methodologies and assumptions for all forecasts are included in supporting technical documents posted on the Authority's website. The Authority is funding and implementing delivery the same way high-speed rail systems have been, and continue to be, developed throughout the world. Specifically, we have a clear, long-term vision and a long-term plan for implementing that vision. The Authority is advancing through a series of phases allowing for incremental extensions as funding becomes available. That is the implementation strategy that the Authority has laid out in past business plans and that we continue to follow.

> "We recognize that, given the project's magnitude, all the funds will not be available in one single installment and that we will have to build the system sequentially, demonstrating progress and value incrementally."
>
> — Brian Kelly,
> Chief Executive Officer

Developing Business Plan Cost Estimates

There are various types of capital cost estimates presented in this Business Plan based on levels of certainty and funding availability. The estimates were impacted by three categories, first identified in the 2023 PUR, including escalation/inflation, scope increases/transfers, and new work to complete the Early Operating Segment Merced to Bakersfield project.

For instance, we have project segments, such as Los Angeles to Anaheim, making progress through the environmental phase. Other projects are moving to advanced design stages to further define the scope, such as the Central Valley stations, extensions to Merced and Bakersfield, and various rail projects advancing through the procurement stage (i.e., trainsets, systems/communications). Lastly, we have projects such as the civil works in the 119-mile Central Valley Segment, for which funding has been identified and secured, design definition is predominately known, and risks have mostly been identified.

Cost estimates vary based on where each project section is in terms of development and delivery. The Authority utilizes industry standard methodologies for estimating risks and costs, including guidance set forth by the Association of for the Advancement of Cost Engineering (AACE) and the federal government (***FTA Oversight Procedure 40 – Risk and Contingency Review***). Additional details are in the 2024 Capital Cost Basis of Estimate technical document. ***Business Plan - Technical Supporting Document - Capital Cost Basis of Estimate Report***

Key Updates

As the project advances through the environmental, design, procurement, and/or construction phases, cost estimates are refreshed at specific intervals (e.g., in the Business Plan or PUR) to inform our stakeholders. The following are highlights in this 2024 Business Plan (some of these items were reported in the 2023 PUR).

- **Completed:** Updated scope, schedule, and risk-based cost estimates associated with the 171-mile Merced to Bakersfield early operating segment:
  - Updated cost estimates for operational elements including stations, trainsets, track, systems, and other operational elements including facilities and power.
  - Updated cost estimates for extensions to Merced and Bakersfield.
  - Updated cost estimates for the 119-mile Central Valley section.
  - Updated cost estimates for program management and contingency.
- **Completed:** Updated capital costs for the San Francisco to San José project section, which reflected the needs of the local community in designing the preferred alignment.

- **Completed:** Updated ARRA Grant, including scope, schedule, and cost changes that are more reflective of the delivery progress in the Central Valley.
- **In Progress:** Capital cost estimates for the remaining Southern California project sections. As stated in the 2023 PUR, the Palmdale to Burbank project section is expected to carry a cost above the baseline estimate, and the same is likely for the Los Angeles to Anaheim project section. Updated cost estimates with the Record-of-Decisions (ROD) are as follows:
  - Palmdale to Burbank — expected early Spring/Summer 2024, following Board action on the environmental ROD for this section.
  - Los Angeles to Anaheim — expected toward the end of 2025, following Board action on the environmental ROD for this section.
- **In Progress:** Updated capital costs once the advanced design stage is completed for the stations, Merced extension, and Bakersfield extension.
- **In Progress:** Projects advancing through the procurement stage, such as track design, construction, systems and communications development, and associated operational elements.
- **Pending:** Project sections that have completed the environmental process and are pending additional funding for moving into the advanced design stage, including San Francisco to San José, San José to Merced, Bakersfield to Palmdale, and Burbank to Los Angeles project sections.

Capital Cost Estimates

No major capital costs updates are presented in this Business Plan. The Authority covered the major updates to the 2022 Business Plan in the 2023 PUR just months ago, and developments since then have not necessitated a revision. The main issues that resulted in cost changes in the 2023 PUR included:

- The Authority's progress on the 119-mile segment on completion of right-of-way (currently 98 percent acquired), completion of the design for the high-speed rail civil infrastructure (currently 100 percent complete), and completion of the utility relocations (currently more than 61 percent complete).
- New schedules and estimates for existing construction work that incorporated significant scopes of work that needed to be settled via change orders, additional risk contingency, and updates due to high levels of global inflation and revised construction schedules.

A comprehensive update of the cost estimates for the Merced to Bakersfield segment consistent with Senate Bill 198, which defined the scope of the Merced to Bakersfield segment as a 171-mile electrified dual-track segment usable for high-speed rail service in the Central Valley from Merced to Bakersfield, with a new intermodal station in downtown Merced and connections to the Amtrak San Joaquins and the Altamont Corridor Express.

- Creation of a schedule envelope for revenue service between Merced and Bakersfield.
- Global inflation in 2021 and 2022, which was at a 40-year high.

Table 5.0: Central Valley Segment (119 Miles) Capital Cost Estimates ($ in Millions)

Scope Element	Estimate YOE	P30	P50	P65	Expenditures
Central Valley Construction	9,589	10,329	10,427	10,514	6,996
Central Valley ROW	1,896	1,917	1,930	1,941	1,475
Track & Systems 119 Single Track	2,722	3,236	3,541	3,813	1
Program Management & Support	686	728	743	769	505
Project Reserve	46	46	46	46	0
Interim Use	162	162	162	162	54
Program Wide Unallocated Contingency	0	318	368	410	0
Subtotal Central Valley Segment Construction	**15,101**	**16,736**	**17,217**	**17,655**	**9,031**
Project Development, Management, and Support	544	575	589	607	546
Total Central Valley Segment	**15,645**	**17,311**	**17,806**	**18,262**	**9,577**

Note: Expenditures as of December 2023

The following tables reflect a range of uncertainty with the various projects in different project development and delivery phases, starting with the estimate in year-of-expenditure (YOE) dollars and followed by a range of potential outcomes between confidence levels of 30 percent and 65 percent ("P30" and "P65"). The YOE estimate is a critical part of the risk process. It is a stripped and adjusted base estimate that starts from a number that is free of risk and serves as the basis for developing a risk range. Given outcomes are uncertain at this time, the Authority recommends a budget that corresponds to a probability level of contingency that aligns with guidance from the federal government, which is P65; however, the Authority's goal is to manage within the P50 level for all projects (see ***FTA Oversight Procedure 40 – Risk and Contingency Review***).

Cost estimates are presented in the following tables to align scope and costs for known projects by segments. **Table 5.0** shows the capital projects and related support costs forecasted to complete the work on the 119-mile Central Valley Segment, and **Table 5.0.1** displays the cost forecast for the 171-mile EOS connecting Merced, Fresno, and Bakersfield, including stations, power, and trainsets.

Cost and Schedule Risk for Current Construction Packages

In the 2022 Business Plan, we reported a list of 13 major commercial issues that previously stifled progress in our construction packages (CPs). Since then, all those issues have been resolved except for Cross Creek, which is in arbitration.

The 2023 PUR recognized progress to date and risks ahead and reset the contingencies. Since then, we have continued to resolve design changes to get further refinement of the scope of work to be completed in the Central Valley. The following change orders are the largest design-related commercial change orders resolved in 2023, and were reported at Board meetings:

- CP 1 Church Avenue: $132.7 million
- CP 2-3 Tied Arch: $24.1 million
- CP 2-3 Conejo Viaduct: $65 million (total of two change orders)
- CP 2-3 Tule River Viaduct: $133 million (total of three change orders)

Resolving these large change orders has further reduced risk. Two of the four issues came in under the estimated budget (Church and Tied Arch), and two came in over budget (Conejo and Tule). The Conejo and Tule viaducts were discussed at the November 2023 Authority Board of Directors meeting. Design changes were needed due to requirements set by BNSF Railroad after the execution of the construction contract for a 5-foot separation/maintenance offset between the high-speed rail structural supports for the pergola structure and the freight rail right-of-way, which required a wider structure with longer, thicker girders and stronger support structures. As design was finalized and marginal cost of the change in materials and labor costs calculated, the Authority determined the contractor was not liable for the any share of the cost because the change was noticed after the contract bid. The cost of materials and other related costs were more than what was estimated in the 2023 PUR. Across these four change orders, negotiated costs were a total of $121 million above PUR estimates.

Ongoing Risks for the Current Construction Packages

While the project has seen significant advancement in defining the scope through the resolution of historic and more current issues, there are still risks to cost and schedule, including resolution of third-party requirements impeding construction (e.g., Canal 9-22 in CP 4 or the cost impact for the final revised baseline schedule on CP 2-3), and other third-party risks related to the completion of the small portion of remaining utility designs. The full costs of the 2023 floods to certain CP 2-3 job sites is also still being determined.

To address these risks, we deploy several risk mitigation tools, such as the Authority's formal Enterprise Risk Management program, strike teams to focus on key issues, and maintenance of contingency funds at the project and program levels to offset increased costs. As of November 30, 2023, the Authority maintained a total contingency balance of $1.3 billion specifically designated for the three construction packages, with an additional unallocated contingency of $410 million.

Typically, a full cost analysis for ongoing construction is performed once every two years, and estimates were last updated 11 months ago with the 2023 PUR. The Authority will continue to work to deliver the civil construction work with the contingencies established in the 2023 PUR. While there is some added pressure from issues such as the Conejo and Tule viaducts — especially for CP 2-3 — and acknowledged ongoing risk, the Authority will continue to be prudent as the increasingly smaller set of open issues are resolved with the contractors. If the Authority determines mitigation efforts or contingency funds are insufficient, we will communicate to our Board of Directors and the California Legislature.

Table 5.0.1: Merced to Bakersfield Segment (171 Miles) and Other Phase 1 Capital Cost Estimates ($ in Millions)

Scope Element	Estimate YOE	P30	P50	P65	Expenditures
Central Valley Segment	15,645	17,311	17,806	18,262	9,578
Project Development Balance	127	127	127	127	127
Merced Extension	2,817	3,326	3,627	3,896	23
Merced Extension ROW	354	454	513	565	0
Bakersfield Extension	1,993	2,358	2,574	2,767	14
Bakersfield Extension ROW	308	395	446	492	0
Stations	875	1,044	1,147	1,237	11
Track & Systems Balance (Including CVS Second Track)	2,162	2,569	2,810	3,025	0
Solar and Utility Interconnection	165	196	214	230	0
Trainsets (6 total)	379	465	516	561	0
Maintenance Facility and Driving Simulator	273	342	382	418	0
Program Wide Support and Contingency Balance	1,123	1,249	1,336	1,396	365
Phase 1 Transfer (Ph1)	0	0	0	0	0
Subtotal Merced to Bakersfield:	**26,222**	**29,833**	**31,497**	**32,976**	**10,118**
Project Development Balance (Ph1)	522	539	545	559	501
Program Wide Support Balance (Ph1)	428	458	475	490	329
Bookend	1,298	1,298	1,298	1,298	745
Total	**28,470**	**32,127**	**33,815**	**35,323**	**11,693**

Note: Expenditures as of December 2023

Northern California Capital Cost Estimates

As reported in the 2023 PUR, since the release of the 2022 Business Plan, the Authority has achieved an ROD on the San Francisco to San José environmental document and updated the capital costs for that section. The cost changes in the San Francisco to San José segment, as reflected in the approved environmental document, include increases in right-of-way acquisition costs for the expanded footprints at Millbrae Station and at the light maintenance facility at Brisbane. They also include Caltrain corridor improvements necessary to accommodate 110-mph maximum operating speeds, and related increases in professional services and contingencies. This section is still at the 15 percent design level; once additional funding is secured, the Authority will advance to the design stage. As design is advanced, cost optimizations (savings) are typically identified through activities like value engineering. The cost ranges represent the accuracy of the estimate as a Class 4 estimate based on the Association for the Advancement of Cost Engineering (AACE) cost classification system as applied to projects that have advanced to about the 15 percent design level.

Table 5.0.2 and **Table 5.0.3** provide capital cost estimates for the work underway in Northern and Southern California and the overall Phase I project.

Table 5.0.2: Northern California Capital Cost Estimates (YOE $ in Millions)

Scope Element	Low	Base	High	Expenditures
Northern California				
San Francisco to San José	3,936	4,967	6,407	0
San José to Gilroy	4,075	6,020	8,733	0
Gilroy to Carlucci Road	10,316	13,627	16,762	0
Central Valley Wye Balance	1,842	2,240	2,601	0
Preliminary Design - Northern California	213	213	213	0
Bookend Investments	798	798	798	707
Total	**21,180**	**27,865**	**35,514**	**707**

Note: Expenditures as of December 2023

Southern California Capital Cost Estimates

The capital cost estimates for the Southern California sections remain unchanged compared to the 2023 PUR. The Bakersfield to Palmdale and Burbank to Los Angeles project sections have completed environmental clearance, and the cost estimates for those sections were updated in the 2023 PUR consistent with the ROD approving those final environmental documents. The cost ranges for those sections represent the accuracy of the estimate as a Class 4 estimate based on the Association for the Advancement of Cost Engineering (AACE) cost classification system as applied to projects that have advanced to about the 15 percent design level.

The two remaining project segments are getting closer to completing the environmental phase, with the Palmdale to Burbank project section expected to be completed in early 2024 and Los Angeles to Anaheim project section in 2025. The cost estimates for those project sections are more uncertain given that environmental analysis is ongoing. The Authority typically updates the cost estimates after the ROD because during the environmental analysis, scope can change significantly as the route alignment is determined, conflicts and community concerns are identified, and scope is added to mitigate for environmental and community issues.

While costs will be further updated after the scope is settled with the ROD, the Authority has been transparent about cost considerations during the environmental process. The 2023 PUR noted that based on the draft environmental report, the cost for the Palmdale to Burbank project section would be around the top of the cost range. That 2022 draft environmental report estimated about $24 billion in base-year dollars, and that estimate does not yet reflect value engineering considerations.

At the November 2023 Board meeting, the Authority presented a Supplemental Alternatives Analysis for the Los Angeles to Anaheim project section. The new alternative presented was estimated to cost about $6.7 billion, about 30 percent ***less*** than the $9.2 billion prior alternative (both in base year dollars without value engineering). Both of those cost estimates exceed the current range listed below. Notably, when the Authority updates the costs for those two segments, the revised total is expected to result in a base cost within the range identified in the 2023 PUR and summarized in **Table 5.0.5** on page 91 for Phase 1.

As environment clearance is achieved, and once additional funding is secured, the Authority can advance the design in each project segment. As design is advanced, cost optimizations (savings) are further identified through activities like value engineering.

Table 5.0.3: Southern California Capital Cost Estimates (YOE $ in Millions)

Scope Element	Low	Base	High	Expenditures
Southern California				
Bakersfield to Palmdale	13,712	17,140	20,740	0
Palmdale to Burbank	12,635	16,775	24,428	0
Burbank to Los Angeles	2,201	2,935	3,405	0
Los Angeles to Anaheim	2,478	2,918	3,352	0
Preliminary Design - Southern California	382	382	382	0
Bookend Investments	500	500	500	38
Total	**31,908**	**40,650**	**52,807**	**38**

Note: Expenditures as of December 2023

Other Program-Wide Capital Cost Estimates

Table 5.0.4 shows the other program-wide costs required to implement the full 500-mile system, including the remaining trainsets (66 total), completing the heavy maintenance facility, solar scope, and project-wide support costs.

The cost of acquiring the balance of trainsets remains unchanged from the estimate presented in the 2023 PUR. The heavy maintenance facility balance cost estimate is lower than the 2022 Business Plan estimate, reflecting a scope shift to make a higher initial investment in this facility as part of the Merced to Bakersfield project (as reported in the 2023 PUR). The solar generation costs and the project development and program management costs outside the Merced to Bakersfield section remain unchanged from the estimate presented in the 2023 PUR.

Table 5.0.5 shows the cost estimates for Phase 1, the full 500-mile system with all the cost updates described in this section incorporated. The Merced to Bakersfield capital cost estimate is presented as a range representing the P30 (low), P50 (base), and P65 (high) confidence levels, while the remaining program capital cost estimates are presented as ranges, with a base estimate and ranges based on AACE guidance appropriate for their level of design.

Table 5.0.4: Program-Wide Capital Cost Estimates (YOE $ in Millions)

Scope Element	Low	Base	High	Expenditures
Program Wide				
Project Development & Support	1,049	1,049	1,049	830
Heavy Maintenance Facility Balance	248	275	301	0
Trainsets Balance	4,161	4,643	5,084	0
Solar Power Generation Balance	166	184	202	0
Total	**5,624**	**6,151**	**6,636**	**830**

Note: Expenditures as of December 2023

Table 5.0.5: San Francisco to Los Angeles/Anaheim (Phase 1) Capital Cost Estimates (YOE $ in Millions)

Scope Element	Low	Base	High	Expenditures
Program Wide				
Merced to Bakersfield	29,833	31,497	32,976	10,118
Northern California	21,180	27,865	35,514	707
Southern California	31,908	40,650	52,807	38
Program Wide	5,624	6,151	6,636	830
Total	**88,545**	**106,163**	**127,933**	**11,693**

Note: Expenditures as of December 2023

Ridership and Revenue

The California Rail Ridership Model (CRRM) is a state-of-the-art travel demand model encompassing the entire state of California as well as external travel links to reflect travel to and from neighboring states. The new model was developed by the Authority in collaboration with the Caltrans Division of Rail and Mass Transportation to reflect in more detail and with an updated database the effects of an integrated high-speed rail network in California, and to evaluate impacts on connecting rail and transit services in the state. The CRRM generates more robust estimates than the previous Business Plan Model (BPM-V3) due to enhanced access/egress from the core network and a new technique known as the pivot process, in which observed 2018 base year data is used to scale future year forecasts.

The developed forecasts in this Business Plan are comprehensive in scope but approximate in nature. The modeling output provides estimates and numbers appropriate for the two study levels evaluated: Valley to Valley (San Francisco to Bakersfield) and Phase 1 (San Francisco to Anaheim).

The estimated ridership and revenue levels for Valley to Valley and Phase 1 service, as shown in **Table 5.1**, **Table 5.1.1**, **Table 5.1.2**, and **Table 5.1.3**, illustrate substantial benefits to California riders and the state economy. For more detail, see the Ridership and Revenue Model, Ridership and Revenue Forecasting, and Ridership and Revenue Risk Analysis technical reports: ***California Rail Ridership Model Documentation***, ***Ridership and Revenue Forecasting Report to the 2024 Business Plan***, ***Ridership and Revenue Risk Analysis Report for the 2024 Business Plan (ca.gov)***

Table 5.1: Valley to Valley High, Medium, and Low Ridership by Year (Unlinked Trips in Millions)

Ridership Level	2030	2040	2050
High	12.5	13.0	13.3
Medium	11.8	12.2	12.5
Low	9.2	9.6	9.8

Table 5.1.1: Valley to Valley High, Medium, and Low Farebox Revenue by Year (YOE $ in Millions)

Ridership Level	2030	2040	2050
High	1,043	1,310	1,633
Medium	960	1,206	1,501
Low	743	934	1,164

Table 5.1.2: Phase 1 High, Medium, and Low Ridership by Year (Unlinked Trips in Millions)

Ridership Level	2030	2040	2050
High	29.8	30.6	31.4
Medium	27.6	28.4	29.0
Low	20.7	21.3	21.8

Table 5.1.3: Phase 1 High, Medium, and Low Farebox Revenue by Year (YOE $ in Millions)

Ridership Level	2030	2040	2050
High	3,094	3,870	4,820
Medium	2,855	3,576	4,444
Low	2,099	2,621	3,260

Greenhouse Gas Analysis

Table 5.2: Valley to Valley GHG Reductions by Year (in Metric Tons of Carbon Dioxide Equivalent)

Ridership Level	2030	2040	2050
Medium	324,000	312,000	314,000

Table 5.2.1: Phase 1 GHG Reductions by Year (in Metric Tons of Carbon Dioxide Equivalent)

Ridership Level	2030	2040	2050
Medium	644,000	611,000	608,000

The information in **Tables 5.2** and **5.2.1** summarizes the benefits achieved for key years by each service implementation phase. For the Silicon Valley and Full Phase 1 system, estimates are provided for 2030, 2040, and 2050.

These calculations are based on the inputs from the ridership modelling for the 2024 Business Plan.

Operations and Maintenance Cost

Based upon the Early Train Operator's (ETO) review and experience, adjustments have been made to the 2024 Business Plan Operations and Maintenance (O&M) model assumptions to incorporate the latest available data. Key enhancements building on the previous 2020 technical report include:

- Reflection of the updated, optimized service plan and the corresponding adjustment of staffing for the services during Valley and Phase 1. For more information on the service plan, see the Service Planning Methodology technical report at: ***2024 Business Plan Service Planning Methodology (ca.gov)***
- Consideration of the inflation-related cost increases for the maintenance and operations cost based on observed labor, energy, and other price-related developments.
- Further development of the cost assumptions for track access fees and station access fees in the shared corridors.
- Updated Authority bus-related costs reflecting the streamlined service plan.

Consistent with the 2020 Business Plan approach, a Monte Carlo simulation was conducted to understand the risks and uncertainties associated with the forecasts. These are then applied to derive a forecast O&M range of costs. The high- and low-cost forecasts presented reflect the results of these Monte Carlo simulations.

The Monte Carlo process begins by identifying a range of potential operating and maintenance costs and revenue outcomes. These are used as inputs into a probability model that selects at random one value from cost and one value from revenue and calculates the results. The model conducts this calculation, selecting randomly each time thousands of times to develop a random distribution of results.

Overall, O&M costs have increased when compared to the 2020 Business Plan. First, the Silicon Valley to Central Valley Line assumes a new service plan that incorporates the Full Wye infrastructure build-out and direct service from San Francisco to Merced. In addition, the ETO's review of previous assumptions and the application of global experience also resulted in baseline cost updates.

Silicon Valley to Central Valley Results

Table 5.3: Valley to Valley High, Medium, and Low O&M Costs by Year (YOE$ in Millions)

O&M Cost Levels	2030	2040	2050
High	789	965	1,179
Medium	721	882	1,077
Low	693	848	1,036

Table 5.3.1: Phase 1 High, Medium, and Low O&M Costs by Year (YOE$ in Millions)

O&M Cost Levels	2030	2040	2050
High	1,617	1,981	2,420
Medium	1,478	1,811	2,212
Low	1,422	1,742	2,129

Table 5.3 summarizes the results of the Silicon Valley to Central Valley analysis. Consistent with ridership and revenue, these results are shown for 2030, 2040, and 2050.

Table 5.3.1 summarizes the analysis for Phase 1 O&M costs. These results are shown for 2030, 2040, and 2050.

Our current operating cost estimates are lower than previous estimates due certain changes in the operations model, including a reduction in the number of buses the Authority will use for destinations beyond high-speed rail stations.

For more information on these changes, please see our **Operations and Maintenance Cost Model Documentation** technical report and our **Service Planning Methodology technical report** for details.

Life Cycle Cost Estimates

The life cycle cost methodology used in this Business Plan compiles all operations, maintenance, rehabilitation, and replacement expenditures the Authority will incur on initial capital investments over 50 years for the Silicon Valley to Central Valley and Phase 1 lines. The costs summarized in **Table 5.4** are specific to rehabilitating and replacing initial capital investments through 2060. Operations and Maintenance costs are reported separately above.

This model methodology is similar to that used in past business plans, which provides a "cash flow" estimate of the funds required for rehabilitation and replacement. It is important to note that capital rehabilitation and replacement costs are based upon component parts of the system, with different longevity and costs. This creates some variability in the amount of budget necessary in any given year to address these rehabilitation and replacement needs. These estimates have changed since the 2020 Business Plan to account for the changed number of trainsets and the higher price level.

In addition, a Monte Carlo analysis was conducted to evaluate a potential range of life cycle cost forecasts. The Monte Carlo methodology employed in 2020 also applies to this 2024 Business Plan analysis.

For more detailed information on this analysis, see the 50-Year Life Cycle Capital Cost Model Documentation Technical Supporting Document at: ***2024 Business Plan Lifecycle Capital Cost Model***

Table 5.4: Silicon Valley to Central Valley Through Phase 1 High, Medium and Low Case Life Cycle Costs Cumulative Through 2060 (YOE$ in Millions)

Life Cycle Cost Level	Cumulative
High	11,234
Medium	10,315
Low	9,356

Net Operating Cash Flow

The estimates in **Table 5.5**, **Table 5.5.1**, and **Table 5.5.2** illustrate the potential net cash flows that could be available from operations and could be applied to future development costs or future financing. Net operating cash flow after capital replacement is determined by calculating the net cash flow from operations (revenue less operations and maintenance (O&M) costs). Revenues include those generated from high-speed rail passenger service (farebox revenue), and feeder and connecting bus service, as well as ancillary revenues. Because full funding for the system has not been identified, the phasing assumptions used for developing the forecasts and estimates are for illustrative purposes.

For more information on this analysis, see the High, Medium and Low Cash Flow Analysis Technical Supporting Document at: ***2024 - Business Plan Technical Supporting Document - Cash Flow Analysis***

Table 5.5: Net Operating Cash Flow Valley to Valley Through Phase 1 High Case (YOE $ in Millions)

Year	Year 1	Year 2	Year 3	Year 4	Year 5
Total Revenue	1,119	1,145	3,399	3,475	3,554
Less: O&M	(805)	(821)	(1,718)	(1,754)	(1,790)
Net Cash Flow from Operations	314	324	1,680	1,722	1,764

Table 5.5.1: Net Operating Cash Flow Valley to Valley Through Phase 1 Medium Case (YOE $ in Millions)

Year	Year 1	Year 2	Year 3	Year 4	Year 5
Total Revenue	1,016	1,039	3,114	3,184	3,257
Less: O&M	(735)	(750)	(1,571)	(1,603)	(1,636)
Net Cash Flow from Operations	280	289	1,543	1,581	1,621

Table 5.5.2: Net Operating Cash Flow Valley to Valley Through Phase 1 Low Case (YOE $ in Millions)

Year	Year 1	Year 2	Year 3	Year 4	Year 5
Total Revenue	775	793	2,274	2,325	2,378
Less: O&M	(707)	(722)	(1,512)	(1,543)	(1,574)
Net Cash Flow from Operations	68	71	763	783	803

Breakeven Analysis

The Breakeven Analysis measures the likelihood that farebox revenue is equal to or greater than operations and maintenance costs in a given operating year. A Monte Carlo analysis is used to conduct this review.

Table 5.6 and **Table 5.6.1** summarize the results of this Monte Carlo analysis for the reference year 2040.

Each table summarizes how often the model predicted a certain value would occur. Each exhibit shows the range of results over all runs. In 2020, this analysis showed a 71 percent probability that the Silicon Valley to Central Valley Line would cover its operations and maintenance costs on the year it opened (2031). That probability rose to 83 percent by the Phase 1 opening year of 2033, and greater than 99 percent by the 2040 horizon year. This analysis included only farebox revenues and would increase further if ancillary and other revenues were considered. It is important to mention that the revenue included ramp-up factors for the first 5 years, separated for Silicon Valley to Central Valley and Phase 1.

The 2024 Breakeven Analysis for Silicon Valley to Central Valley and Phase 1 has been conducted for a steady state operation (without ramp-up assumptions) and will be reported for the reference year 2040. Over the previous 2020 Business Plan, the chance of profitability increases from 71.3 percent (for year 2031) to 81.7 percent for Silicon Valley to Central valley. This is primarily caused by the ramp-up factor used in the first 5 years in the 2020 Business Plan. The breakeven probability for Phase 1 for 2040 decreases slightly from 99.4 percent in the 2020 Business Plan to 98.4 percent in the actual analysis.

It is important to note these assumptions are used for forecasting and estimating purposes only. These figures will continue to change as operating costs are further refined, as ridership estimates change and as the schedule for construction becomes more certain for these lines.

Table 5.6: Valley to Valley Breakeven Future Year 2040 (YOE $ in Millions)

Probability Distribution	Net Operating Cash Flow
10%	(71)
25%	46
Median	204
75%	386
90%	580

Chance of Profitability: 81.7%

Table 5.6.1: Phase 1 Breakeven Future Year 2040 (YOE $ in Millions)

Probability Distribution	Net Operating Cash Flow
10%	413
25%	799
Median	1,340
75%	1,986
90%	2,668

Chance of Profitability: 98.4%

Central Valley Service

The Central Valley Service, guided by the Universal Operator concept, is managed by the San Joaquin Joint Powers Authority (SJJPA). This approach integrates various transportation services — high-speed rail, San Joaquins (SJ), Altamont Corridor Express (ACE), and intercity bus services — to enhance efficiency and customer experience.

This section provides a preliminary overview of the work on ridership and revenue projections for the 2024 Business Plan. Currently, all forecasts are in progress, being developed in collaboration with the various stakeholders involved in the Central Valley Service.

Following the release of the 2023 Project Update Report (PUR), immediate steps were taken to further update the ridership modeling for the Central Valley Service transportation network, which consists of several interconnected transportation modes. The work involved collaboration with stakeholders, focusing on aligning service plans, fare structures, and connectivity assumptions. Additionally, the California Rail Ridership Model (CRRM) underwent a comprehensive recoding to incorporate updated socioeconomic forecasts and additional elements pivotal to understanding the Central Valley's complex transportation dynamics. This included a more detailed modelling of the state's air network, auto network (including auto tolls), and the overall transit network (encompassing transit fares).

The CRRM requires final validation of the comprehensive consideration of planned investments in California's transportation system, including investments aiming at improved intermodal connectivity, and final alignment of model assumptions with stakeholders to yield a balanced and comprehensive understanding of the future transportation network in California. Our focus will converge on three critical areas. First, ongoing discussions about service plans and fare models necessitate deeper alignment to ensure uniformity across all stakeholders. Second, a meticulous examination and integration of operational and maintenance cost drivers are imperative to reconcile current cost projections with real-world observations. Third, the CRRM will undergo final calibration and assumption updates to more accurately reflect the large number of variables influencing California's future transportation network.

The Authority will provide refinements to these outcomes in the 2025 Project Update Report (PUR). These results will mirror the state of California's forthcoming investments and align with the objectives set forth in the California State Rail Plan. They promise to offer a comprehensive view of the positive developments planned for the state's integrated transportation network.

For the 2024 Business Plan, the 2023 PUR forecasts will be used for the sake of continuity and reference.

Ridership and Revenue

Table 5.7: Central Valley Segment Ridership in 2030 (Unlinked Trips in Millions)

Ridership Level	No Build	Build
Central Valley Service	3.9	6.6

Table 5.7.1: Central Valley Segment Farebox Revenue in 2030 (YOE $ in Millions)

Revenue Level	No Build	Build
Central Valley Service	95	156

Greenhouse Gas Analysis

Table 5.7.2 illustrates emissions reduction estimates for the Merced to Bakersfield operating segment in 2030.

Table 5.7.2: Central Valley Segment GHG Reductions in 2030 (in Metric Tons of Carbon Dioxide Equivalent)

Ridership Level	2030
Medium	92,000

Photo: Construction at Hanford-Viaduct

APPENDICES

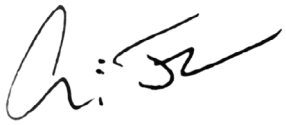
Appendix A. Statutory Requirements for a Business Plan

Note from California High-Speed Rail Chief Counsel

DATE: **April 26, 2024**
TO: **File**
FROM: **Alicia Fowler, Chief Counsel**
SUBJECT: **Review of final 2024 Business Plan and Appendix**

As part of the process of following the statutory requirements for producing the Authority's final 2024 Business Plan, I have reviewed the final 2024 Business Plan and Appendix, and I confirm that all elements required pursuant to CA Public Utilities Code section 185033 and 185033.7 are included therein.

The Authority's governing statutes are established in the California Public Utili



-185038; Section 185033 lays out the requirements for the Business Plan. In 2022, SB 198 **added a new Section 185033.7 to the Public Utilities Code to specify additional information in** future Project Update Reports and Business Plans. These new requirements are addressed in the second and third table in this Appendix.

Section 185033 requirements for the Business Plan are as follows:

185033 (a) The authority shall prepare, publish, adopt, and submit to the Legislature, not later than May 1, 2014, and every two years thereafter, a business plan. At least 60 days prior to the publication of the plan, the authority shall publish a draft business plan for public review and comment. The draft plan shall also be submitted to the Senate Committee on Transportation and Housing, the Assembly Committee on Transportation, the Senate Committee on Budget and Fiscal Review, and the Assembly Committee on Budget.

(b) (1) The business plan shall include, but need not be limited to, all of the following elements:

(A) A description of the type of service the authority is developing and the proposed chronology for the construction of the statewide high-speed rail system, and the estimated capital costs for each segment or combination of segments.

(B) A forecast of the expected patronage, service levels, and operating and maintenance costs for the Phase 1 corridor as identified in paragraph (2) of subdivision (b) of Section 2704.04 of the Streets and Highways Code and by each segment or combination of segments for which a project level environmental

analysis is being prepared for Phase 1. The forecast shall assume a high, medium, and low level of patronage and a realistic operating planning scenario for each level of service.

(C) Alternative financial scenarios for different levels of service, based on the patronage forecast in subparagraph (B), and the operating break-even points for each alternative. Each scenario shall assume the terms of subparagraph (J) of paragraph (2) of subdivision (c) of Section 2704.08 of the Streets and Highways Code.

(D) The expected schedule for completing environmental review, and initiating and completing construction for each segment or combination of segments of Phase 1.

(E) An estimate and description of the total anticipated federal, state, local, and other funds the authority intends to access to fund the construction and operation of the system, and the level of confidence for obtaining each type of funding.

(F) Any written agreements with public or private entities to fund components of the high-speed rail system, including stations and terminals, and any impediments to the completion of the system.

(G) Alternative public-private development strategies for the implementation of Phase 1.

(H) A discussion of all reasonably foreseeable risks the project may encounter, including, but not limited to, risks associated with the project's finances, patronage, right-of-way acquisition, environmental clearances, construction, equipment, and technology, and other risks associated with the project's development. The plan shall describe the authority's strategies, processes, or other actions it intends to utilize to manage those risks.

(2) To the extent feasible, the business plan
should draw upon information and material developed according to other requirements, including, but not limited to, the pre-appropriation review process and the pre-expenditure review process in the Safe, Reliable High-Speed Passenger Train Bond Act for the 21st Century pursuant to Section 2704.08 of the Streets and Highways Code. The authority shall hold at least one public hearing on the business plan and shall adopt the plan at a regularly scheduled meeting. When adopting the plan, the authority shall take into consideration comments from the public hearing and written comments that it receives in that regard, and any hearings that the Legislature may hold prior to adoption of the plan.

All of these requirements are addressed in this 2024 Business Plan. The following table describes where each requirement is met.

Public Utilities Code Section 185033 Requirements	Response to Requirements and Location	Page(s)
The Authority shall prepare, publish, adopt, and submit to the Legislature, not later than May 1, 2014, and every two years thereafter, a business plan.	This is the 2024 Business Plan. It was adopted on April 11, 2024, and was submitted to the Legislature by May 1, 2024	
At least 60 days prior to the publication of the plan, the Authority shall publish a draft business plan for public review and comment.	Public comment period began February 9, 2024, and was completed on April 9, 2024	
The draft plan shall also be submitted to the Senate Committee on Transportation and Housing, the Assembly Committee on Transportation, the Senate Committee on Budget and Fiscal Review, and the Assembly Committee on Budget.	Assembly Transportation Committee hearing held on March 11, 2024; Senate Transportation Committee hearing held on March 12, 2024	
A description of the type of service the Authority is developing.	Chapter 1 Chapter 2	Pg. 1, 15-49
The proposed chronology for the construction of the statewide high-speed rail system.	Chapter 2	Pg. 26-29, 34, 37
The estimated capital costs for each segment or combination of segments.	Chapter 5	Pg. 92-97
A forecast of the expected patronage, service levels, and operating and maintenance costs for the Phase 1 corridor as identified in paragraph (2) of subdivision (b) of Section 2704.04 of the Streets and Highways Code and by each segment or combination of segments for which a project level environmental analysis is being prepared for Phase 1. The forecast shall assume a high, medium, and low level of patronage and a realistic operating planning scenario for each level of service.	Chapter 1 Chapter 5 ***Ridership and Revenue Forecasting***	Pg. 11-12, 98-104
Alternative financial scenarios for different levels of service, based on the patronage forecast in subparagraph (above), and the operating breakeven points for each alternative. Each scenario shall assume the terms of subparagraph (J) of paragraph (2) of subdivision (c) of Section 2704.08 of the Streets and Highways Code.	Chapter 5 ***Ridership and Revenue Forecasting***	Pg. 98-104
The expected schedule for completing environmental review, and initiating and completing construction for each segment or combination of segments of Phase 1.	Executive Summary Chapter 1 Chapter 2	Pg. XII, 2, 4-5, 28-29
An estimate and description of the total anticipated federal, state, local, and other funds the authority intends to access to fund the construction and operation of the system, and the level of confidence for obtaining each type of funding.	Chapter 3	Pg. 62-68

Public Utilities Code Section 185033 Requirements	Response to Requirements and Location	Page(s)
Any written agreements with public or private entities to fund components of the high-speed rail system, including stations and terminals, and any impediments to the completion of the system.	Chapter 1 Chapter 2 Chapter 3 Chapter 4	Pg. 1-3, 42-43, 47-49, 53, 58-59
Alternative public-private development strategies for the implementation of Phase 1.	Chapter 3	Pg. 68
A discussion of all reasonably foreseeable risks the project may encounter, including, but not limited to, risks associated with the project's finances, patronage, right-of-way acquisition, environmental clearances, construction, equipment, and technology, and other risks associated with the project's development. The plan shall describe the authority's strategies, processes, or other actions it intends to utilize to manage those risks.	Chapter 4	Pg. 73-87
To the extent feasible, the business plan should draw upon information and material developed according to other requirements, including, but not limited to, the pre-appropriation review process and the pre-expenditure review process in the Safe, Reliable High-Speed Passenger Train Bond Act for the 21st Century pursuant to Section 2704.08 of the Streets and Highways Code.	Chapter 3	Pg. 51-70
The Authority shall hold at least one public hearing on the business plan and shall adopt the plan at a regularly scheduled meeting.	Public Hearing on February 29, 2024; Meeting for adoption on April 11, 2024	
When adopting the plan, the authority shall take into consideration comments from the public hearing and written comments that it receives in that regard, and any hearings that the Legislature may hold prior to adoption of the plan.	To be considered by the Authority in preparing final plan.	

Statutory Schedules Requirements (SB 198): Business Plan

In 2022, SB 198 modified the requirements for the information that is to be included in the Business Plan. SB 198 added a new Section 185033.7 to the Public Utilities Code, and this new section specified that a set of delivery schedules be added to the Project Update Report and the Business Plan.

As set forth in Section 185033.7 (b) (1), As part of the business plan that is due on or before May 1, 2024, pursuant to Section 185033.5, the authority shall develop schedules related to the delivery of all of the following tasks:

- Completion of the 119-mile dual track segment from Madera to Poplar Avenue, which means Avenue 19 in the County of Madera to one mile north of the Tulare-Kern County line southward to north of Bakersfield, currently near Poplar Avenue.
- Completion of right-of-way, planning, and advance engineering for extensions to Merced and Bakersfield.
- Completion of an agreement or agreements between the state, the San Joaquin Joint Powers Authority, the San Joaquin Regional Rail Commission, and the authority that details the role of each in planning, constructing, and funding the connection in the City of Merced.
- Completion of an agreement or agreements between the state, the San Joaquin Joint Powers Authority, the San Joaquin Regional Rail Commission, and the authority covering the planning, funding, and operation of the proposed high-speed rail services from Merced to Bakersfield and the authority and approval for the San Joaquin Joint Powers Authority to contract for the operation of the high-speed rail services.
- Provision of an updated cost estimate with a stated probability level, or levels, of its ongoing contracts and for the work it is funding and managing that is required to complete the merger to Bakersfield segment extensions.
- Completion of a funding plan that includes any additional federal funding awards for the Merced to Bakers- field segment.

(G) Additional milestones required for the completion of the Merced to Bakersfield segment and the full Phase 1 System pursuant to subparagraphs (A) to (F), inclusive.

(2) The delivery schedules developed pursuant to paragraph (1) shall be included and updated in each subsequent business plan adopted pursuant to Section 185033 and project update report prepared pursuant to Section 185033.5."

SB 198 Statutory Delivery Schedules Requirements	Location	Page
(a) Completion of the 119-mile dual track segment from Madera to Poplar Avenue, which means Avenue 19 in the County of Madera to one mile north of the Tulare-Kern County line southward to north of Bakersfield, currently near Poplar Avenue.	Executive Summary Chapter 1 Chapter 2	Pg. XII, 5, 15-26
(b) Completion of right-of-way, planning, and advance engineering for extensions to Merced and Bakersfield.	Chapter 2	Pg. 19, 28-29
(c) Completion of an agreement or agreements between the state, the San Joaquin Joint Powers Authority, the San Joaquin Regional Rail Commission, and the authority that details the role of each in planning, constructing, and funding the connection in the City of Merced.	Chapter 2	Pg. 30-32, 36-38
(d) Completion of an agreement or agreements between the state, the San Joaquin Joint Powers Authority, the San Joaquin Regional Rail Commission, and the authority covering the planning, funding, and operation of the proposed high- speed rail services from Merced to Bakersfield and the authority and approval for the San Joaquin Joint Powers Authority to contract for the operation of the high-speed rail services.	Chapter 2 Chapter 5	Pg. 36-38, 103
(e) Provision of an updated cost estimate with a stated probability level, or levels, of its ongoing contracts and for the work it is funding and managing that is required to complete the Merced to Bakersfield segment extensions.	Chapter 5	Pg. 92-94
(f) Completion of a funding plan that includes any additional federal funding awards for the Merced to Bakersfield segment.	Chapter 3	Pg. 54-64
(g) Additional milestones required for the completion of the Merced to Bakersfield segment and the full Phase 1 System pursuant to subparagraphs (A) to (F), inclusive.	Chapter 1 Chapter 2	Pg. 4-5, 17-37

Statutory Cost/Funding Requirements (SB 198): Business Plan

In 2022, SB 198 modified the requirements for the information that is to be included in the Business Plan. SB 198 added a new Section 185033.7 to the Public Utilities Code; this new section specified that a set of cost and funding requirements be added to the Project Update Report and the Business Plan. The required information pursuant to 185033.7(c)(1) includes:

- Estimated and actual civil works costs of the Merced to Bakersfield segment.
- Estimated and actual right-of-way, acquisitions, utilities, and other third-party agreement costs.
- Estimates of contract costs, including contingencies to cover change orders.
- Other costs, estimated and actual, including, but not limited to, rolling stock, interim use, and stations.
- Costs reported in a manner than can be comparable across reports.
- Updates on the authority's progress on achieving project milestones, as established in the project update report or the business plan adopted pursuant to Section 185033.
- Funding commitments beyond the Merced to Bakersfield segment, and spending to meet those commitments to date, including funding sources used to meet identified funding commitments.

SB 198 Statutory Delivery Schedules Requirements	Location	Page
(a) Estimated and actual civil works costs of the Merced to Bakersfield segment.	Chapter 5	Pg.94
(b) Estimated and actual right-of-way, acquisitions, utilities, and other third-party agreement costs.	Chapter 5	Pg. 92-94
(c) Estimates of contract costs, including contingencies to cover change orders.	Chapter 3 Chapter 5	Pg. 53 Pg. 90-93
(d) Other costs, estimated and actual, including, but not limited to, rolling stock, interim use, and stations.	Chapter 5	Pg. 94
(e) Costs reported in a manner than can be comparable across reports.	Chapter 5	Pg. 89-97
(f) Updates on the authority's progress on achieving project milestones, as established in the project update report or the business plan adopted pursuant to Section 185033.	Chapter 1 Chapter 2	Pg. XIV-XV, 1-12, 16-29, 34-37, 40-49
(g) Funding commitments beyond the Merced to Bakersfield segment, and spending to meet those commitments to date, including funding sources used to meet identified funding commitments.	Chapter 3	Pg. 66

Appendix B: Letter from the Office of the Inspector General - 2024 Business Plan

May 1, 2024

The Governor of California
President pro Tempore of the Senate
Speaker of the Assembly
State Capitol
Sacramento, California

Dear Governor and Legislative Leaders:

This letter summarizes a review conducted by the Office of the Inspector General, High-Speed Rail (OIG-HSR) of the California High-Speed Rail Authority's (Authority) May 2024 Business Plan (business plan). In accordance with Public Utility Code 187038 (a), the OIG-HSR provides this letter report summarizing its findings and recommendations regarding the Authority's business plan, which state law requires the Authority to publish on May 1 of every even numbered calendar year. As described below, we reviewed a draft of the business plan and, during March 2024 legislative hearings, shared our initial concerns regarding certain weaknesses we observed in the draft. Since that time, we have completed our review of the business plan and determined that the Authority resolved many of our initial concerns but did not fully resolve others. We also found additional areas in which the Authority's annual reports could be improved. Finally, based on additional information provided by the Authority in its business plan and our review of the Authority's underlying support, we highlight some critical aspects of the Merced-to-Bakersfield segment, including the project schedule for completing the segment, that require strategic focus from the Authority and state lawmakers.

The OIG-HSR Completed Reviews of the Authority's Annual Reports and Shared Its Concerns with the Authority and State Lawmakers

In 2023, following a process established in state law, the Legislature and Governor's Office appointed California's first Inspector General for High-Speed Rail. The stated purpose of establishing the OIG-HSR, which began its operations on September 1, 2023, is to better ensure the success of the high-speed rail project (project) and meet the expectations of taxpayers by ensuring that information state decisionmakers have about the project is accurate, current, and impartial.

In January 2024, our office issued a letter summarizing our review of the Authority's 2023 Project Update Report and began reviewing the Authority's draft business plan. Based on these reviews, we shared some initial concerns about the draft plan in meetings with the Authority and in legislative hearings. In doing so, we highlighted the need for the Authority to do the following:

- Publish a more detailed funding plan for the Merced-to-Bakersfield segment.
- Formally establish a policy on when it will update project costs.
- More clearly address each statutorily required reporting element.
- Better describe its progress in establishing needed operating agreements, as well as the implementation of management controls designed to mitigate key project risks.

Through April 2024, we followed up on these and other concerns and continued reviewing the business plan—including the revised version of the plan the Authority subsequently released—as well as the Authority's underlying support. In the sections that follow, we describe the concerns that the Authority addressed with revisions to its business plan, as well as those concerns that were not fully resolved. We also highlight additional improvements the Authority should make to its annual reports going forward and some critical areas in need of strategic focus by the Authority and state lawmakers.

The Authority Resolved Many of the Concerns We Expressed Regarding Its Draft Business Plan

We are pleased to report that the Authority made progress in addressing the initial concerns we raised regarding the draft business plan, some of which extend back to the Authority's 2023 Project Update Report. Specifically, the Authority completed the following:

- On April 11, at the same meeting during which the Authority's board approved the revised business plan, the Authority proposed and its board adopted a policy outlining the circumstances under which the Authority will update capital cost estimates for the Merced-to-Bakersfield segment as well as the remainder of Phase 1. In implementing our recommendation from the 2023 Project Update Report, the new policy sets minimum criteria defining the circumstances under which stakeholders can expect to see such cost updates in subsequent annual reports.

- The Authority made improvements to the revised business plan by including elements that are required by state law but that were missing from the draft plan. Examples of these now-present elements include the following:
    - Specific costs related to the acquisition of right-of-way for the Merced and Bakersfield extensions.
    - Actual capital expenditures to date for various cost elements of the project.
    - The Authority's level of confidence for the prospective sources of funding it has identified.

- The Authority worked proactively with our office to address concerns we raised about the completeness and transparency of the draft business plan's discussion of risks to the project and actions the Authority is taking in response. As a result, the revised plan includes a more complete discussion of the project's top risks and gives stakeholders valuable information about the status of the Authority's efforts to respond.

- The Authority increased the precision of the revised business plan's appendix, which identifies the location of statutorily required information throughout the document.

Finally, the Authority took important steps in its revised business plan toward implementing the second of our two Project Update Report recommendations—improving the usefulness of the Merced-to-Bakersfield funding plan. Although we do not believe our recommendation is fully implemented, which we explain in detail below, the business plan now includes a table identifying federal grant funding opportunities for unfunded elements of the Merced-to-Bakersfield segment. The table also identifies the latest dates the Authority can secure that funding and still complete the segment inside the schedule "envelope" of 2030-2033 that it introduced in the 2023 Project Update Report. This improvement in the funding plan and the other improvements to the revised business plan described above represent progress towards increased clarity and transparency in the Authority's report to state lawmakers and other stakeholders. Even so, as we describe below and in the following sections, there still existed areas for improvement in the funding plan and other parts of the Authority's annual reports.

For example, following the adoption of the revised business plan on April 11, 2024, we determined that several issues with the plan's clarity and completeness remained. In response to our ongoing concerns, the Authority made further revisions to the plan, which included the following:

- Adding two statutorily required elements that the revised plan did not contain—right-of way costs for the 119-mile Central Valley portion of the Merced-to-Bakersfield segment and the expected schedule for completion of right-of way acquisition for the segment. With respect to the latter, the Authority added text about its progress and planning for right-of-way acquisition; because of the amount of detail in this new text, we were unable to verify its accuracy. However, we noted that the newly provided date of right-of-way completion—fiscal year 2026-27— is less specific than and may or may not be consistent with the acquisition completion dates for the extensions in the Authority's approved Merced-to-Bakersfield schedule, which are June and November 2026. [1]

- Providing additional context about the planned Merced-to-Bakersfield operating agreements to update stakeholders about the apparent lack of progress in that area between the 2023 Project Update Report and the 2024 draft and revised business plans.[2]

- Adding detail to its discussion of operations and maintenance cost estimates that explains why, despite the described increase in overall costs, some of the business plan's estimates are lower than previous estimates. To provide additional clarification for readers of the plan, we also note here that this newly added context applies specifically to the Phase 1 cost estimates.

The Authority's Funding Plan Needs Further Development

Although the Authority's revised Merced-to-Bakersfield funding plan is an improvement on past funding plans, it does not completely implement our recommendation and stops short of fully informing project stakeholders on the likelihood of receiving federal grant funding in time to keep the Merced-to-Bakersfield segment on schedule. In its revised business plan, the Authority provided Table 3.3. That version of the table focused solely on approximately $7 billion in

[1] We discuss the schedule for the segment in more detail in the final section of this letter.

[2] The business plan's discussion of this issue now indicates the agreements will be reached in order to meet a "timeline for revenue service by [the Authority's] 2030 to 2033 schedule window." However, Exhibit 2.7 still reflects a completion date of 2030 for the final operating agreements. As such, there continues to be a degree of uncertainty about the most likely timing of the agreements.

federal grant opportunities and did not provide a clear breakdown of the funding gap for the segment. After we expressed concern with this focus, the Authority added the "Total Scope" and "State Match" columns shown in Table 3.3 of the final business plan. Although they represent an improvement in terms of the plan's detail, we did not have time to validate the newly provided totals or the Authority's explanation of those totals. We will do so in our review of subsequent annual reports. This improvement notwithstanding, we remain concerned with the following aspects of the funding plan:

- The revised funding plan does not provide dates to keep the segment on the Authority's current schedule. The range of dates included in the funding plan spans from an optimal date of securing funding of "now" to the last possible time at which to secure funding and still complete the segment by 2033. This presentation does not tell stakeholders when funding would need to be secured to have the segment completed by the end of 2030—the official completion date in the Authority's project schedule. Although providing the later date that would make 2033 achievable is of value, presenting stakeholders with an ideal date of "now" is unrealistic and therefore unhelpful. A better approach would be to provide stakeholders a range of dates that aligns with both ends of the segment completion window.

- The revised funding plan lists federal grants that the Authority considers a best fit for each unfunded component of the Merced-to-Bakersfield segment, but it does not provide any further analysis of the relative prospects of securing those funds by the dates listed. Table 3.2 of the business plan provides a description of, and the total amount appropriated for, the federal grant programs in question. However, the plan contains no further analysis of how much of that appropriated funding remains or how much the Authority might reasonably expect to obtain from these sources. Indeed, although the Authority separately states that its confidence level in continued federal funding is high should the current federal administration continue past 2024, it is not clear from the funding plan itself or any underlying support we have reviewed why the Authority would have a high level of confidence in receiving the necessary funding from the federal grants listed in Table 3.3, particularly in time to keep the Merced-to-Bakersfield segment on schedule.

The Authority and state lawmakers have acknowledged that achieving the vision of a revenue-generating initial operating run between Merced and Bakersfield that also links to conventional rail lines to the Bay Area and Sacramento is critical to the ultimate success of the project. To

realize this vision, the Authority must establish and work towards a realistically achievable project schedule; to accomplish that aim, in turn, the Authority and state lawmakers need a realistically achievable funding plan. Viewing the revised funding plan in its totality, we are concerned that the information provided by the Authority could give stakeholders more comfort about the prospect of receiving federal funds in time to keep the Merced-to-Bakersfield segment on schedule than is warranted by the underlying conditions and analytical support. Thus, although we acknowledge the progress the Authority has made, we conclude that the revised funding plan stops short of fully implementing our recommendation because it does not provide project stakeholders with sufficient clarity to make critical decisions.

Recommendations

To provide state lawmakers and other project stakeholders with the information they need to make key decisions, the Authority should continue to refine its published funding plan and the underlying analytical support for that funding plan to accomplish the following:

- For each unfunded component, provide a range of dates by which funding must be identified and secured that aligns with both ends of the segment's schedule envelope.
- Analyze the relative prospects of receiving federal funds from the named programs in time to keep the Merced-to-Bakersfield segment on schedule and summarize this analysis in its annual reports.
- Provide state lawmakers with clear information on whether and when additional funds, beyond those that can be reasonably expected to be obtained from federal sources, must be identified in order to keep the Merced-to-Bakersfield segment on schedule.

Authority Response

The Authority agrees with the general recommendation to continue to refine information on program funding, including the status and outlook for federal grant awards. The 2025 Project Update Report will include further updates. Below, the Authority comments on each of the specific three bullets:

- Exhibit 3.3 was added between the 2024 Draft Business Plan and the 2024 Revised Business Plan as a result of discussions and a recommendation from the OIG that requested target dates for securing funds to complete unfunded elements of the Merced to Bakersfield segment. Consistent with the recommendation, the Revised Draft 2024 Business Plan included new narrative discussing the funding situation and the introduction of Exhibit 3.3, which together provide a range of time for funding targets. In addition, the Exhibit 3.3 provides a range of time for funding between an ideal scenario to a critical date to maintain the schedule window. The Authority affirms that now is ideal, which is supported by numerous letters from the California High-Speed Rail Authority Peer Review Group since 2022 and that the three-year window is appropriate at this point in time given there is nearly $7 billion in unfunded scope for the Merced to Bakersfield project remaining. In addition, the Authority will be updating the schedule for the Merced to Bakersfield project in the 2025 Project Update Report now that significant federal funding was received, designs have advanced for the Merced and Bakersfield Extensions, and the rail delivery strategy has been solidified.

- The 2025 Project Update Report will include an update of any newly awarded federal grants and assess the prospects for future grant awards. In terms of the *relative* prospects of receiving federal funds from the named programs, the Authority has confidence in all grants it applies for and believes it would be counterproductive to produce a comparison showing by grant program where confidence is relatively higher or relatively lower on a pending grant application.

- The Authority agrees with this recommendation to provide additional information on when funds beyond federal funds may be needed to stay on schedule. However, we note the uncertainty that comes with forecasting future federal grant awards. The Authority has added a statement to Page 62 of the 2024 Final Business Plan to partially address this issue by stating the desirability of stabilizing state funding in the 2025-26 session.

OIG-HSR Comment on Authority Response to Recommendations

The Authority appears to be focused on a particular word—*ideal*—that is not included in the recommendation above. Indeed, because of the way the Authority has interpreted that word, which originally appeared in our review of the 2023 Project Update Report, we felt the need to be more specific in the recommendation resulting from our current review. As indicated above, we believe the Authority should replace its unrealistic “now” narrative with an assessment of when funding would have to be secured to keep the project on target for the beginning of its

project schedule window, which currently is the end of 2030. The Authority did not specifically respond to this element of the recommendation.

Regarding the need for the Authority to analyze the relative prospects of receiving federal funds from specific federal programs, our recommendation is clear that the details of this analysis could be contained in within the underlying support for its annual reports and that annual reports could then summarize the results of those efforts. As a means of establishing realistic prospects for specific sources and timing of project funds, performing this type of underlying analysis would not be *counterproductive*; rather, it is *necessary.* Therefore, we stand by our recommendation that the Authority do so.

Our Review Identified Areas of the Business Plan Needing Additional Information to Ensure a Balanced Picture for Stakeholders

In addition to the issues discussed above, we identified two areas of the business plan that, although not factually inaccurate or incomplete from a statutory perspective, required additional context to provide stakeholders with a complete and balanced understanding of project conditions. Those two areas involve the Authority's construction quality assurance processes and the plan's Phase 1 travel time comparison between high-speed trains and other modes of travel. In response to our concerns, the Authority added new text to the revised plan's discussion of these areas, and in the case of the travel time comparison, ultimately resolved our concern with an explanatory footnote.

First, the plan accurately describes positive feedback received from an independent review of the Authority's quality assurance and quality control processes. In doing so, the plan provides the scores that the independent review assigned to a selection of completed project bridges using a specified federal inspection standard. However, the draft business plan did not make clear that, in addition to providing those scores, the independent reviewer also provided a series of recommendations to address quality concerns that the reviewer identified in some of the Authority's processes and structures. As of the business plan's adoption, the Authority had not demonstrated its progress in implementing the review's recommendations, and so we could not determine the extent of any such progress. Changes to the revised business plan better convey that the Authority's construction quality efforts are ongoing and that its capacity to implement the recommendations depends in part on additional state resources it has requested. Nonetheless, the plan stops short of explaining where in those efforts the Authority currently finds itself or the most pressing concerns it plans to address on the way to achieving its quality goals.

Second, we had concerns about the appropriateness of the business plan's travel time comparison among different modes of transportation. We reviewed support the Authority provided for the travel times between San Francisco and Los Angeles in Exhibit 0.0 and determined that the reported high-speed rail travel time of 2 hours and 40 minutes represents the travel time that the high-speed rail system is technically capable of achieving per the Authority's trip modeling. However, that published travel time is not representative of what passengers are likely to experience.

According to a separate technical report that the Authority issued in support of the business plan, the fastest high-speed rail travel time for a scheduled trip is 3 hours and 5 minutes—about half an hour longer than Exhibit 0.0 indicates. In contrast, the published travel times by car, plane, and existing rail each had a basis in actual trips, such as typical car trip time generated from Google Maps data and scheduled rail trips posted by Amtrak. Therefore, although the exhibit's overall message that high-speed rail will be more time-efficient than certain other modes of travel is credible, the presentation had indicated time savings greater than those likely to occur under an operational Phase 1. In response to this concern, the Authority ultimately added a footnote to Exhibit 0.0 explaining that the travel time presented for high-speed rail is its designed time and providing an estimate of the scheduled travel time between San Francisco and Los Angeles.

Recommendations

To ensure that its 2025 Progress Update Report provides state lawmakers and project stakeholders with complete, balanced, and fairly presented information, the Authority should provide information on the implementation status of recommendations stemming from the independent review of its construction quality assurance and quality control processes.

Authority Response

The Authority agrees with the recommendation and will include the identified information in the 2025 Project Update Report.

Some Critical Components of the Project Need Further Strategic Development by the Authority and Continued Focus from Project Stakeholders

In its 2023 Project Update report, the Authority laid out what it characterized as "an aggressive goal to initiate service" on the Merced-to-Bakersfield segment by the end of 2030, with a risk-based "schedule envelope" of 2033. In its 2024 business plan, the Authority retained this

schedule for the segment, along with estimated capital costs for completing it. In so doing, the Authority also carried over ridership estimates for the broader Central Valley service of which the segment will be part. For the following reasons, we believe the Authority needs to reassess and provide stakeholders with updates to its Merced-to Bakersfield schedule, cost projections, and ridership estimates:

- Recent developments to design and procurement activities raise risks to the feasibility of completing the Merced-to-Bakersfield segment by 2030.

- Substantial delays to the construction of the segment would likely carry significant cost impacts—calling into further question the prospects for securing sufficient funding for completing the segment under such a scenario.

- Additional information, particularly revised estimates for Central Valley ridership, is needed for stakeholders, and state policymakers in particular, to assess the financial implications of operating the segment once completed.

Emerging Concerns About the Merced-to-Bakersfield Schedule

In our office's review of the 2023 Project Update Report, conducted in late 2023 and published in January 2024, we concluded that the Authority had a generally reasonable basis for its cost and schedule estimates. However, we also noted that the Authority's scheduling documentation supporting the prospective components of its 2030 timeframe is subject to more uncertainty than work already underway. Because these components, namely the Merced and Bakersfield extensions' civil construction, track and systems, and trainsets, are also logically sequenced to be completed later in the 2030 timeframe than the civil work packages currently in construction, any delays to those components carry more risk to the overall segment schedule. Through an analysis of key schedule elements and with the benefit of the several months that have transpired since our previous review, our updated conclusion is that although there is no decisive evidence that the December 2030 operating date is not achievable, there is increasing risk to the feasibility of that schedule.

One key area in which we identified emerging risks to the segment schedule relates to the design of the segment extensions. Although the business plan notes that the extensions have achieved 30 percent draft design, key work still needs to occur before design can progress overall and allow for subsequent activities like construction. However, when reviewing detailed

schedule documentation for the design of the Merced extension, we found that the projected dates for the key activity of completing designs for utility relocations have fallen behind the original schedule by several months, from late 2024 to May 2025. The Authority does not yet have an official timeframe from its contractor for reaching 100 percent completion of the extension design, and although Authority staff described efforts to mitigate the utility delays by accelerating other elements of the design, there is also risk of this key activity falling further behind.

Utility relocation design is an important precursor to planning and construction activities that follow. For example, although the Authority's right-of-way acquisition plan indicates that it can proceed with acquiring certain required properties in advance of completed design, identifying and acquiring other property types will depend on having reliable information on how and where needed utility relocations will take place. Notably, although the Authority's current master schedule for the Merced-to-Bakersfield extension shows that the Authority planned to begin acquiring right-of-way for the extensions in August of 2023, the revised business plan now indicates that the Authority will "commence [the] right-of-way process" on the extensions sometime in the second half of 2024. Importantly, citing previous delays and cost overruns in the ongoing Central Valley construction projects, Authority leadership has recently and publicly committed to waiting to begin construction on the Merced and Bakersfield extensions until right-of way acquisition and utility relocation have been completed. Although it represents a responsible and measured approach given what the Authority cites as "lessons learned" from previous construction contracts, this commitment to careful sequencing also underscores the importance of detecting and mitigating schedule delays to early works like design and utility relocation.

Additionally, our review indicates that some key procurements necessary for completing the Merced-to-Bakersfield extension have experienced delays when compared to the schedule the Authority had in place roughly one year ago. For example, a July 2023 presentation to the Authority's board included a planned release of a procurement for track and overhead systems construction by the end of 2023. The revised business plan now identifies August 2025 as the timeframe for releasing that procurement. The July 2023 presentation also identified the end of that year as the target for releasing the Authority's procurement for signaling, traction power, and related systems; the business plan now indicates the procurement will go out at some point in calendar year 2024. Several of these delays appear modest thus far, and the Authority's board approved releasing the request for proposals for the crucial trainsets procurement at its recent April 11 meeting. Despite these mitigating factors, because the majority of these

contracting activities are still pending there remains a risk of further delays before the Authority is prepared to release the procurements. Any such additional delays that do occur could, in turn, be compounded by the need to extend bidding periods after a procurement has been released—which the Authority recently did for the statement of qualifications related to the track and overhead systems' design.

Notably, the Authority's revised funding plan itself casts doubt on the current feasibility of commencing Merced-to-Bakersfield revenue operations by the end of 2030. As we discuss above, the plan does not provide a date by which funding, if received, would facilitate a 2030 completion schedule. However, the dates the plan does provide for completion by 2033 are noteworthy. For example, the plan indicates that roughly $3 billion in new federal funding for civil construction to Merced would need to be committed by the first quarter of 2026 to allow for a 2033 completion window. The Authority confirmed for us that each of these individual scopes and dates is critical to meeting the 2033 timeline; as such, the plan raises questions about how 2030 is possible given that the needed funding date for 2033 (three years later) is less than two years from today.

Delays that push completion of construction past 2030 would carry significant cost implications. Notwithstanding its contingencies, the Authority's current capital cost estimates for the Merced-to-Bakersfield segment are based on the 2030 completion date. Even under such a schedule, the Authority's cost estimate documentation for the Merced extension, for example, attributes approximately $366 million of the $2.82 billion total cost for the extension's design and civil construction to the effects of inflation. Given inflation's considerable anticipated impact under the current schedule and its compounding effects on total cost, any substantial delays to the completion of the segment's construction would likely include significant cost increases beyond the Authority's current year-of-expenditure estimates. Because the identified funding gap and associated strategy described in the business plan are based on the current schedule, any such delays would therefore also affect the additional funds needed to be secured.

These risks warrant intensive and ongoing attention to the current feasibility of the Merced-to-Bakersfield segment schedule and the individual risks associated with it. In conducting our review of the business plan and the schedule contained therein, we did not attempt to verify the specific causes of the schedule shifts discussed above or evaluate the Authority's efforts to prevent or mitigate them. We see a role in performing that work as our office becomes fully staffed in the coming year. Similarly, nothing discussed above should be interpreted as a conclusion by the OIG-HSR that 2030 is not possible or that it is not appropriate for the

Authority to have identified a schedule envelope for contingency purposes. However, our review argues for vigilance by the Authority in both reevaluating its current schedule and determining what can be done to meet it, including by seeking to mitigate any incremental delays it has encountered thus far or that it expects may emerge in the future. In its final revisions to the board-adopted business plan, the Authority acknowledged the need to perform these analyses.

Need for Increased Clarity Regarding Merced-to-Bakersfield Operating Projections

The business plan is missing complete, updated information in another key area. In its draft plan, the Authority republished ridership numbers from the 2023 Project Update Report but indicated it would provide additional information about the service model and its likely outcomes in the final published plan. However, the revised plan further delays the release of this information to the 2025 Project Update Report.

The Authority explained to us that it, along with the other agencies involved in operating the future service, is continuing the work of verifying data and did not want to prematurely include updated ridership numbers in the business plan. According to the Authority, waiting until 2025 will provide more time to further analyze data and reach agreement on ridership, operations and maintenance costs, and fares.

Notwithstanding the stated need for further analysis, greater certainty about the ridership and revenue assumptions underlying the system is important for helping plan a successful Central Valley operation, including by determining the likely financial scenario it will present. It is reasonable that the Authority would want to reach consensus on the key elements of an operating service and would seek to publish the most realistic ridership and cost information possible. However, in addition to carrying forward previous ridership estimates, the adopted business plan does not contain projected operations and maintenance costs for the Merced-to-Bakersfield segment or the Central Valley service model as a whole. As such, although the plan's financial analysis of the eventual Valley-to-Valley operation and full Phase 1 system indicate those segments would likely be financially self-sustaining, the Central Valley discussion leaves open the question of whether and how much public funding this initial service will need to operate. Although state law does not specifically require the business plan to include that information for this segment, we conclude that because no alternative model currently exists for operating Merced-to-Bakersfield, such information would nonetheless be of use to policymakers.

Recommendations

To provide stakeholders updated and necessary information on key strategic concerns related to the completion and operation of the Merced-to-Bakersfield segment, the Authority should take the following actions and publish the results in its 2025 Project Update Report:

- Review and, to the extent necessary, revise its schedule for completion and operation of the segment.
- In so doing, review and revise the associated schedule envelope, identifying and documenting opportunities to mitigate delays that have already occurred and prevent future delays.
- Working with its partners for the Central Valley service, fulfill its commitment to refining and publishing the results of its ridership model, along with the other information necessary to provide the most reliable data possible about the likely need for operating subsidies for the service.

Authority Response

The Authority agrees with the recommendation and has already begun the analysis and work efforts to update its schedule for the Merced to Bakersfield project, including revised completion dates and analysis of actual performance for impacts to the schedule envelope. The results of which will be provided in the in the 2025 Project Update Report.

Respectfully submitted,

Benjamin M. Belnap, CIA
Inspector General, High-Speed Rail

Appendix C. PRG Letter

California High-Speed Rail Peer Review Group

Kome Ajisi	William Ibbs	Fredrick Jordan	Stacey Mortensen	Bijan Sartipi	Beverly Scott	Lou Thompson Chair

March 8, 2024

The Honorable Mike McGuire
Senate President Pro Tem
1021 O Street, Suite 8518
Sacramento, CA 95814

The Honorable Robert Rivas
Speaker of the Assembly
1021 O Street, Suite 8330
Sacramento, CA 95814

The Honorable Brian Jones
Senate Republican Leader
1021 O St. Suite 7640
Sacramento, CA 95814

The Honorable James Gallagher
Assembly Republican Leader
State Capitol Building
Room 4740
Sacramento, CA 95814

Dear Honorable Members:

The Peer Review Group is required to report to the Legislature on selected reports and documents published by the California High-Speed Rail Authority. In this letter we provide our comments on the 2024 Draft Business Plan issued by the Authority on February 9, 2024.

Since inception in 2008, the Group has issued 19 letters and members have testified before Legislative and Congressional committees 17 times. All of our documents can be found on the Group's website at www.cahsrprg.com. In our letter and testimony on the 2023 Project Update Report (2023 PUR), we emphasized three themes: 1) project costs, schedules, and ridership estimates are uncertain, and projections are subject to significant risk of deteriorating; 2) the project is underfunded, and its financing is unstable, raising costs and making effective management difficult if not impossible; 3) more legislative oversight is needed to promote better fiscal and policy awareness of the critical issues that the future of the project poses. There is nothing in the 2024 Draft Business Plan to change the thrust of these themes.

Some of the uncertainties we discussed in the 2023 PUR have been clarified. For example, the $3.3 billion the Authority received from the Federal Railroad Administration plugged part of the gap in funding needed for the proposed section from Merced to Bakersfield. Another year of work has brought the construction work, property acquisition and utility relocations in the current 119-mile program closer to completion. The experience the Authority has gained has led it to propose new procurement strategies that are expected to ameliorate some of the problems encountered in the first set of construction packages. There has been progress, but 15 years after project inception, the State is still at the beginning of an immense and technically challenging megaproject impacting many common and often conflicting public and private interests. The experience and progress so far should be weighed against the manifest challenges ahead.

ASSESSMENT OF THE DRAFT 2024 BUSINESS PLAN

		Medium (P50) Estimates ($ billions)				
		2018 BP	**2020 BP**	**2022 BP**	**2023 PUR**	**2024 BP**
NORTHERN CALIFORNIA						
	San Francisco to San Jose	2.1	2.1	1.7	5.0	5.0
	San Jose to Carlucci Road	13.5	14.2	19.6	19.6	19.6
	Central Valley Wye balance	2.4	2.5	2.2	2.2	2.2
	Other (Design and bookends)	*1.0*	*1.0*	1.0	1.0	1.0
	subtotal	18.9	19.8	24.5	27.9	27.9
CENTRAL VALLEY						
	Merced to Madera		3.7	2.3	5.9	5.9
	Madera to Poplar Ave.	13.7	12.4	13.9	17.8	17.8
	Poplar Ave to Bakersfield			1.3	4.1	4.1
	Other (Shops, Trainsets, etc)	2.2	1.8	3.5	3.7	3.7
	subtotal	15.9	17.8	21.0	31.5	31.5
SOUTHERN CALIFORNIA						
	Bakersfield to Palmdale	16.3	16.3	18.4	17.1	17.1
	Palmdale to Burbank	17.5	17.5	16.8	16.8	16.8
	Burbank to Los Angeles	1.5	1.5	2.9	2.9	2.9
	Los Angeles to Anaheim	3.6	3.6	2.9	2.9	2.9
	Other (Design and bookends)			0.4	0.9	0.9
	subtotal	39.0	39.0	41.4	40.7	40.7
PROGRAM WIDE						
	Program Wide	4.3	4.3	5.1	6.2	6.2
TOTAL		78.1	81.0	92.1	106.2	106.2

Project costs. The table above is an estimate because the numbers for prior years are not on a consistent basis. It shows that project costs have risen in every Business Plan, with no clear end in sight. Overall project costs (P50 level) have grown by about 15 percent since the 2022 Business Plan. This does not tell the entire story, however, as the costs of the Southern California section have not materially changed in the six years since the 2018 Business Plan.

A second issue is that most of the project cost estimates are not based on actual bids but are instead supported by various degrees of design completion, usually 30 percent or less. This is

true both for the type of civil works (property acquisition, utility relocation and large viaducts) that are not yet started but that the Authority has experience with and, more important, for major elements (electrification, signaling, tunneling, and rolling stock) where there is no experience at all. For example, no bids have been received on the added civil works between Merced and Madera (33 miles) and between Poplar Avenue and Bakersfield (19 miles), which will amount to about $5.4 billion. There are also no bids at all on most of the work outside the Central Valley (323 miles), which is over 70 percent of the Phase I cost.

		Original Contract Price	Current Contract Amount	Percent Current Overrun	Award Date	Original Completion Date	Current Forecast Completion Date	Completion Delay
		$ billions	$ billions	%	Mo-Yr	Mo-Yr	Mo-Yr	Years/Mos
CP 1	32 Mi Madera to Fresno	1.023	3.613	253.2	Aug -13	Mar-18	Nov-26	6/7
CP 2-3	65 Mi. Fresno to near Kern co. Line	1.365	3.225	136.3	June-15	Aug-19	May-26	6/9
CP 4	22 Mi Near Kern Co. Line to Poplar Ave	0.444	0.783	76.4	Feb-16	Jun-19	Jan-24	4/7
SR-99*	Relocate SR 99 in Fresno	0.23	0.296	28.7	Feb-13	Jun-19	Dec-21	2/6
Total		3.062	7.917	158.6				

The current contract values for Construction Package One (CP 1), CP2/3, CP4 and the State Road 99 relocation are 158 percent higher than the original award values, up from a 97 percent increase a year ago. The Phase I system cost (P50) level grew from $81 billion in the 2012 Business Plan to $92 billion in the 2022 Business Plan and to $106 billion in the Draft 2024 Business Plan. This is a 31 percent increase from 2020 to 2024 (in YOE $), and a 15 percent increase from 2022 to 2024. While this does not differ greatly from experience with other megaprojects, it does not lend much confidence to projections of future performance.

To be fair to current Authority management, CP1, CP2-3, and CP4 were early contracts awarded in a hurry without adequate preparation and using a method of management (Design/Build) that the Authority may not be using in future contracting. With the benefit of experience and a strengthened construction management team, the Authority has a better handle on project sequencing (e.g. acquire the right-of-way before commencing construction) and on the appropriate forms of contracting, so the extreme experience shown above may not recur. With this acknowledged, it will be some years before we can conclude that the Authority's construction problems on the project are under control.

Schedules. The table above shows that the construction projects underway so far have experienced delays of between 2 years 6 months and 6 years 9 months (a weighted average of 6 years 3 months). Completion of the Merced to Bakersfield section is now scheduled between 2030 and 2033, but this assumes that future contracts will come closer to meeting projections than past contracts have. There is no longer a projected completion date for the full Phase I system because there is no funding on which to base a credible schedule.

Ridership. Demand forecasts have fallen. The forecast ridership for 2040 in the 2009 Business Plan was 41 million. In the 2012 Business Plan it was 37 million, in the 2022 Business Plan it was 38.6 million, and in the Draft 2024 Business Plan it is now foreseen as 28.4 million. These changes have come about partly because of a change in the model used to forecast ridership and partly because of changes in the economic and demographic factors that generate ridership.

To put the projections in perspective, the Authority states (pg. 11) "When the project is extended into northern California and Silicon Valley from the Central Valley, ridership is anticipated to jump to more than 12 million riders annually, roughly the equivalent of the current Northeast Corridor intercity service on the East Coast. When operational between Los Angeles and San Francisco, California's high-speed rail service is projected to carry roughly 29 million riders, almost 2.5 times the current ridership of the Northeast corridor intercity service." The population served in the Northeast Corridor between Washington, DC and Boston is roughly 4 times that of San Francisco to Bakersfield and 60 percent greater than San Francisco to Anaheim, and all the major eastern cities have well-developed mass transit systems and airline competition, except for Washington, DC to Boston, is not dominant. Though we acknowledge that the operations in California between San Jose and Burbank will be at higher speed than in the Northeast, we believe that questions about the accuracy of the models will remain until demand is proven. If these forecasts are not borne out in practice, the impact on the performance of the Merced to Bakersfield operations and on San Francisco to Bakersfield could be significant.

Inflation. The impact of inflation has been significant. The values used are based on the best available official sources, but necessarily require forecasts of events that are hard to predict. In particular, the estimates for the Southern California segments of the project, approximately 41 percent of the total cost of Phase I, have not materially changed since 2018. Re-estimating them will clearly add billions of dollars to the estimates of project cost.

The Memorandum of Understanding (MOU) of November 2020, among CalSTA, the Authority and the San Joaquin Joint Powers Authority (SJJPA) was a necessary step, but little has been done since to assign planning and funding responsibilities for construction in the Merced and Madera stations. The much more complex high-speed rail operating agreement among CalSTA, the Authority and SJJPA has also not been concluded, which is a matter of concern as the viability of the interim operation of the Central Valley service depends on the way service is determined and costs are managed, computed, and assigned among the parties. The Authority should foster intensive, ongoing consultations with SJJPA and the State to ensure the best balance of costs and service concepts based on SJJPA's operating expertise.

The terms of Proposition 1A prohibit the Authority from generating deficits, so **all** of its costs must be covered by SJJPA, presumably through some form of cost-reimbursable lease. If those costs are higher than expected, as is likely to be the case for the operation and maintenance of 220 mph rolling stock and maintenance of the highly precise tracks capable of 220 mph service, and if demand and revenue do not reach the levels projected (see discussion above), the initial burden would fall on SJJPA. SJJPA would certainly have to transfer that burden directly to CalSTA and thus to the State budget. The operations planning discussion on pages 35 and 36

lays out a conceptual path forward but is probably too slow given that the eventual outcome may interact with near-term decisions.

LinkUS. We note with dismay the news (pg. 46) that the LinkUS project has encountered a "significant budget shortfall." LinkUS is intended to create a direct routing through Los Angeles Union Station, and is one of the elements, along with electrification of Caltrain (to be finished in 2024), of greatest and most immediate benefit to local rail passenger services as well as high-speed services. We urge the Authority, LA Metro, the State and the Legislature to work together in remedying the shortfall before issuance of the 2025 PUR.

New federal money. The total award target of $8 billion in new federal grant funding is speculative because the total potential federal "pot" has many claimants. While California did recently receive an additional $3.3 billion in federal grants (and that is good news) and will surely receive some of the remaining money, the outcome is unpredictable, especially year-to-year. More important, we join the Authority in re-emphasizing the fact that this kind of unreliable and fluctuating, year-to-year funding is not compatible with the stable and predictable funding that the management of a large infrastructure project must have.

"Mind the gap." The unfunded gap between identified credible sources of funding, on the one hand, and project costs on the other continues to grow. In the early years of the project, the Authority argued that state funds of $9 billion would be combined with federal, local and private sources to finance the project in roughly one-third proportions. The 2009 Business Plan even argued that there would be no need for state funding beyond the $9 billion in Prop 1A funding. Since then, the gap has grown with every Business Plan. This is partly because potential private investors have said that private involvement must await system completion and several years of operation to demonstrate actual demand and operating costs. More important, neither the federal contribution nor state (or local) funding have kept pace with rising project costs.

The 2024 Draft Business Plan now shows that for the Merced to Bakersfield section the **unfunded gap (P65) could be up to $6.7 billion**, including the recent $3.3 billion in federal funding. Most of this gap might be closed by winning the hoped-for $4.7 billion in added federal funds and by assuming an average of $1.25 billion annually in Cap-and-Trade receipts rather than the $1.0 billion as currently assumed. Crucially, though, this also assumes that the estimates for the remaining construction as well as for electrification, signaling, rolling stock and stations will prove correct. More important, the 2024 Draft Business Plan shows a **Phase I unfunded gap (P65) of $93 billion to $99 billion**, again depending on success with meeting the target for additional federal grants and receipts from Cap-and-Trade funding.

The dilemma. The dilemma the project now poses is that, given the expected cost increases, delays, and demand decreases for the Merced to Bakersfield segment, there are few who would argue that completing a complex, high-speed section, by itself, at a cost of up to $35 billion, can be justified. Rather, it would make sense only in the context of a commitment to building the complete Phase I system. At the same time, completing the full Phase I system poses a growing financial challenge for the State because the funding gap is already large, and costs have been

increasing faster than identifiable potential financing while forecast ridership has fallen. *There is no existing federal or state program that would fill this gap, either as to size or stability.*

CONSIDERATIONS FOR THE LEGISLATURE

In our letter discussing the 2023 PUR we noted that the full Phase I system will cost at least three times as much, will take 15-20 years longer, will not meet the trip times specified and will carry only about 70 percent of the passengers – far short of the promises when Proposition 1A was passed. This has not changed in the 2024 Draft Business Plan. Given that there will be many large claims on the State's budgets in the coming decades, we suggested that the Legislature might want to commission an **independent** review of the economic and financial justification for the project, including the ability to operate without subsidy as required by Proposition 1A, before recommitting to the full Phase I system. *We continue to urge that this be done.*

We also suggested that the Legislature might want to:

- Request that the selection and appointment of the Inspector General (OIG) be given high priority. *We note with satisfaction that the IG has been appointed.*
- Request the Authority to issue updated dashboard information in the format used for the ARRA dashboards so that the cost and schedule experience of awarded contracts can be easily evaluated and updated. *We fully share the IG's concern (pg. 114) that project costs and cost updates be published in a format that clearly identifies which costs have been updated and uses a consistent and comparable basis for the numbers presented. Current presentations are complex and difficult to compare with earlier results. We do note that the Authority has recently re-started the dashboards in the simplified ARRA format. We expect that this approach will be continued in an appropriate form for all significant future contract packages. We recommend that the dashboards be posted more prominently on the Authority's website rather than being listed under Legislative Affairs.*
- Review the reports by the Authority on the award of all large new contracts (track and systems, rolling stock, stations, and the Merced and Bakersfield extensions) showing the contract value and expected completion time as compared with the 2024 Draft Business Plan's values. *No new contracts have been awarded since the 2023 PUR, but we continue to make this suggestion because performance on the new contracts will be an important precursor of future experience.*
- As proposed by the Authority, limit ("phase") contract awards outside the 119-mile Madera to Poplar Avenue section in accord with actual availability of funding. *The planned contracting approach of limited Notices to Proceed will be helpful in this respect though there are some components, such as rolling stock, that are not amenable to partial contracts*.
- Request development (by LAO or another appropriate agency) of an analysis with options and tradeoffs available to the Legislature for how to fund the potential up to $7 billion gap for completion of the Merced to Bakersfield section and the $93 to $99 billion gap between this section and the remainder of the Phase I system. **It is critical that any funding approach be fully funded and stable and predictable from year to year**. *This has not been done and is ever more important. We cannot emphasize too strongly that lack of action by the Legislature and Governor to identify an adequate and stable source of funding for the*

project is increasing costs and hindering management's control of the project. The Authority discusses this issue at several points (pages vii, xii, 49, 57 and 62). The statement on page 49: "No megaproject that will take years to construct and is built to operate for decades can be fully realized with its only ongoing funding source ending in 2030" is particularly relevant. We agree fully.

- Request the Authority to assess changes that could be made to reduce costs in the Merced to Bakersfield section pending decision by the Legislature whether to authorize extension outside the Central Valley. An assessment would be useful because the State still has the option to limit the project to a revised form of the Merced to Bakersfield section if funds run short or if the evaluation of Phase I is unfavorable. *This has not been done. If the Authority awards contracts for rolling stock and for the electrification and signaling in the coming year, it will no longer be relevant as the State will be committed much more firmly to the full, high-speed Merced to Bakersfield service.*
- Request the Authority to identify options for reorganizing the project into more manageable parts. For example, create a separate agency (or designate Caltrans) to award and manage tunnel construction to meet specifications set by the authority. *This has not been done.*
- Request the Authority to assess the current staffing and organizational structure of the Authority to determine if the staffing level and organizational structure match future project requirements, given possible changes in delivery systems, program schedule (including more concurrency of projects), funding conditions and other circumstances. *The Authority has made progress in this regard. The Authority's staffing may be adequate for near-term needs.*
- Commission an **independent** study of the experience of the project and the lessons the State should learn from this (and other recent mega-projects) that must be applied to future megaprojects the State undertakes or supports. *This has not been done. We continue to argue that it could have an important impact on future projects.*

We would like to add a request for the Legislature's consideration. Over the past five Business Plans, the roles of the LAO and the Peer Review Group have converged. LAO's work has been excellent and their conclusions closely parallel ours. The Senate and Assembly transportation staff are unusually experienced and competent, and we have consistently concurred with their summary papers. The creation of the OIG adds another voice to the discussion. The Group has attempted to cooperate closely with all of these, and we believe their work is of great value. The question is what, if any, value the Group can add to the work of these well-staffed and professional agencies. We would appreciate any guidance the Legislature may have.

Please let me know if the Group can provide further information or answer any questions you may have.

Sincerely,

Louis S. Thompson

Louis S. Thompson

Chair, California High-Speed Rail Peer Review Group

cc: Hon. Dave Cortesi, Chair, Senate Committee on Transportation
Hon. Roger W. Niello, Vice Chair, Senate Committee on Transportation
Hon. Lori Wilson, Chair, Assembly Transportation Committee
Hon. Vince Fong, Vice Chair, Assembly Transportation Committee
Toks Omishakin, Secretary, California State Transportation Agency
Gabriel Petek, State Legislative Analyst
Samuel Assefa, Director, Governor's Office of Planning and Research
Tom Richards, Chairman, California High-Speed Rail Authority
Brian Kelly, Chief Executive Officer, California High-Speed Rail Authority
Members, California High-Speed Rail Peer Review Group

Appendix D. Acronyms Table

Acronym	Definition
ARRA	American Recovery and Reinvestment Act
ARTIC	Anaheim Regional Transportation Intermodal Center
BART	Bay Area Rapid Transit
BCP	Budget change proposal
BIL	Bipartisan Infrastructure Law
BNSF	BNSF Railway
BPM-V3	Business Plan Model - Version 3
CalSTA	California State Transportation Agency
Caltrans	California Department of Transportation
CBA	Community Benefits Agreement
CEQA	California Environmental Quality Act
CP 1	Construction Package 1
CP 2-3	Construction Packages 2-3
CP 4	Construction Package 4
CRISI	Consolidated Rail Infrastructure and Safety Improvements
CRRM	California Rail Ridership Model
DBE	Disadvantaged Business Enterprise
DVBE	Disabled Veteran Business Enterprise
EIR	Environmental Impact Report
EIS	Environmental Impact Statement
ETO	Early Train Operator
FRA	Federal Railroad Administration
GGRF	Greenhouse Gas Reduction Fund (a.k.a. Cap-and-Trade proceeds)
GHG	Greenhouse Gas
IIJA	Infrastructure Investment and Jobs Act
LAO	Legislative Analyst's Office
LinkUS	Link Union Station Project
LOSSAN Corridor	Los Angeles–San Diego–San Luis Obispo Rail Corridor
Metro	Los Angeles County Metropolitan Transportation Authority
MOU	Memorandum of Understanding
NOD	Notice of Determination
NTP	Notice to Proceed
OCS	Overhead Contract System
NEPA	National Environmental Policy Act
PFAL	Project Finance Advisory, Ltd.
PRG	Peer Review Group
PTC	Positive Train Control

Acronym	Definition
RAISE	Rebuilding American Infrastructure with Sustainability and Equity
RFQ	Request for Qualifications
ROD	Record of Decision
ROW	Right-of-Way
SAA	Supplemental Alternative Analysis
SCC	Standard Cost Category
SJJPA	San Joaquin Joint Powers Authority
TIRCP	Transit and Intercity Rail Capital Program
UIC	International Union of Railways
UPRR	Union Pacific Railroad
VMT	Vehicle Miles Traveled
YOE	Year of Expenditure

2024 BUSINESS PLAN

CALIFORNIA
High-Speed Rail Authority

California High-Speed Rail Authority
770 L Street, Suite 620, Sacramento, CA 95814 • (916) 324-1541
info@hsr.ca.gov • ***www.hsr.ca.gov*** • ***www.buildhsr.com***

Instagram *Facebook* *X* *LinkedIn* *YouTube*